

Vapor Intrusion Mitigation Work Plan

For

Valley Asphalt Property / South Dayton Dump & Landfill Site
Moraine, Ohio

Submitted to:
U.S. EPA, Region 5
Emergency Response Branch
Cincinnati, Ohio
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1.0 INTRODUCTION

Bowser-Morner Inc. prepared this Vapor Intrusion (VI) Mitigation Work Plan on behalf of Valley Asphalt, Respondent to the Removal Unilateral Administrative Order (UAO) issued by U.S. EPA (EPA) on March 22, 2013. This Work Plan details mitigation measures to address concentrations of volatile organic compounds (VOCs) and explosive gases detected in sub-slab soil vapor and indoor air in buildings owned by Valley Asphalt (Valley). The approved Work Plan is a fully enforceable part of the Order. A copy of the Order is enclosed as Appendix A.

Valley's property (Site) is an approximate 10-acre parcel that is located on a portion of the South Dayton Dump and Landfill site (SDDL site) in Moraine, Ohio. The SDDL is a former industrial waste landfill that consists of approximately 80 acres, which accepted household wastes, drums, metal turnings, fly ash, foundry sand, demolition debris, wooden pallets, asphalt, paint, paint thinner, oils, break fluid, asbestos, solvents, transformers, and other industrial wastes. A group of potentially Responsible Parties (PRPs) is working a project parallel to Valley's in accordance with the Administrative Settlement Agreement and Order on Consent for Removal Action (ASAOC) with EPA, for the SDDL site. The PRP group and their consultant, known as "others" in this report, have provided much of the information found in this Work Plan.

This Work Plan was prepared in accordance with the following documents:

- United States Environmental Protection Agency (EPA) Vapor Intrusion Investigation Work Plan (EPA, November 2011),
- EPA Region 5 Vapor Intrusion Guidebook (EPA, 2010) (EPA Region 5 Guidance);
- Ohio Environmental Protection Agency (OEPA) Sample Collection and Evaluation of Vapor Intrusion to Indoor Air Guidance Document (OEPA, May 2010); and
- OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance) (EPA, November 2002).

Bowser-Morner has also prepared this Work Plan to comply with the substantive requirements of Ohio Administrative Code (OAC) 3745-27-12 with respect to permanent monitoring for explosive gas in buildings location within the limits of waste. This mitigation work will be completed in accordance with Section 104(1)(1) of the Comprehensive Environmental, Response, Compensation and Liability Act (CERCLA), 42 U.S.C §960 (a)(1), and 40 CFR §300.415 (Removal Action) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) to abate or eliminate the immediate threats posed to public health and/or the environment.

Installation of the mitigation systems for VOCs and explosive gases will require approximately 100 calendar days after approval of this Work Plan by EPA to complete, followed by regularly-scheduled performance testing activities. A Project Schedule, which details milestones and task duration, is presented in Section 7.

1.1 OBJECTIVES OF THE VI MITIGATION ACTIVITY

This VI Mitigation Plan is intended to directly address actual or potential releases of hazardous substances on the Site, which may pose an imminent and substantial endangerment to public health, or welfare, or the environment. The VI Mitigation activity's primary objective is to design and install a vapor abatement mitigation system in on-Site commercial structures impacted by subsurface gas migration, if the concentration(s) of contaminant(s) of concern (COCs) are greater than Ohio Department of Health (ODH)¹ sub-slab or indoor air screening levels and the presence of the COC is determined to be a result of vapor intrusion.

To achieve this objective, the following removal activities will be completed at a minimum:

- Develop and implement a Site Health and Safety Plan.
- Conduct gas sampling (including VOCs and methane) using sub-slab and indoor air sampling techniques.

1 ODH Health Assessment Section provided screening levels for sub-slab and indoor air contaminants of concern in a letter dated July 6, 2012. ODH screening levels for naphthalene were provided by electronic mail (email) on September 13, 2012. Revised ODH screening levels to correct the indoor air non-residential values for o-xylene were issued on October 9, 2012.

- Installation of a sub-slab depressurization system (SSDS), sealing cracks in walls and floors of the basement, and sealing drains that could be a pathway for vapor intrusion. The vapor mitigation systems will be designed to control levels of methane and VOCs to below ODH sub-slab and indoor air screening levels.
- Develop and implement a proficiency sample plan to confirm that ODH screening levels are achieved for COCs following installation of on-site vapor mitigation systems. If ODH screening levels are not achieved within 30-days of installation, Valley will submit a Corrective Action Plan to EPA within 30 days of discovery.
- Develop and implement an operations, maintenance and monitoring (OM&M) plan at buildings where SSDSs are installed, including a long term inspection and monitoring plan.

1.2 SITE DESCRIPTION

The SDDL site encompasses 1901 through 2153 Dryden Road and 2225 East River Road in Moraine, Ohio. Valley Asphalt purchased a portion of the site on May 7, 1993. For purposes of this report, the property owned by Valley will be referred to as the “Site”. The Site has mailing addresses of 1901 and 1903 Dryden Road in Moraine, Ohio and is depicted in Figure 1.1. The Site is an irregularly-shaped property located in the northern portion of the SDDL site. The Site is bounded to the north and west by the Miami Conservancy District (MCD) floodway, the Great Miami River Recreational Trail and the Great Miami River (GMR) beyond. The Site is bounded to the east by Dryden Road and the SDDL site with light industrial facilities and residential properties beyond. The Site is bounded entirely to the south by the SDDL site.

The Site is currently occupied by Valley’s Dryden Road asphalt plant facility. Until a few years ago, Murphy’s Plumbing, a “squatter” who appears to have sold and stored ceramic bathroom fixtures and other plumbing supplies on-site, occupied a small portion of the northeast corner of the Site. In addition, a single-story block garage appears to straddle the Valley property line immediately adjacent and south of the entrance drive onto the site. According to Mark Fornes Realty, Jack Boesch owns this building, identified as Building 7 in this (and previous) report(s).

Valley's project encompasses the buildings shown in Table 1

TABLE 1
VALLEY ASPHALT BUILDINGS ADDRESSED IN MITIGATION PLAN

Building Number	Address	Use/Description
1	1901 Dryden Road	Former office building; 1500 square feet; slab-on-grade
2	1903 Dryden Road	Bricked-front area of the building previously was used as office space/rear area of building is used for storage; 4,888 square feet; slab-on-grade
4	1901 Dryden Road	Plant control building with basement; 280 square feet
5	1901 Dryden Road	Quality control building; 280 square feet; slab-on-grade
6	1901 Dryden Road	Pre-fab metal storage shed; 218 square feet; earthen floor
7	Dryden Road	Storage building owned by others; 822 square feet; appears to be slab-on-grade
MP	Dryden Road	Former plumbing supply; 365 square feet; undetermined construction

Commercial and industrial properties bound the SSDL site to the east and south including an approximate 30-acre maintenance facility owned by Dayton Power and Light (DP&L). Additional commercial and industrial properties are located on the opposite bank of the GMR to the northeast, north, northwest west and southwest. The Montgomery County Sewage Disposal facility is located on the opposite bank of the GMR, southwest from the Site.

Approximately 25,060 people live within a 4-mile radius of the Site. Residential properties exist more than 1,500 feet (ft) north of the Site beyond the opposite bank of the

GMR. Other residential properties are located at least 1,000-feet south and southeast of the Site, along Dryden and East River Roads.

A landfill operated on the approximate 80-acre SDDL site from the 1940s until 1996. Municipal, commercial, industrial and residual wastes and construction and demolition (C&D) debris were disposed of at the landfill over the years. Combustible wastes were often burned.

First leased, then purchased, an asphalt plant has been operated by Valley on the Site since the mid-1950s. During that time, Valley has stored raw materials, batched asphalt, and conducted quality-related testing on-site and sold driveway sealer to the public.

COCs indentified in the fill, waste, and soil at the SDDL site consist of the following: VOCs including but not limited to trichlorethene (TCE), cis-1,2-dichloroethene (cis, 1-2,DCE), vinyl chloride (VC) and benzene; semi-volatile organic compounds (SVOCs) including, but not limited to, polynuclear aromatic hydrocarbons (PAHs) and naphthalene; polychlorinated biphenyls (PCBs); and metals including lead, copper, arsenic and other inorganic chemicals. Contaminants, including VOCs, arsenic, lead and some other chemicals detected in the landfill, have been detected in groundwater samples collected from a number of monitoring wells at and near the SDDL site. Napthalene and VOCs, including benzene, chlorobenzene, cis-1,2-DCE, isopropyl benzene, ethylbenzene, TCE and VC were also detected in sampled collected from soil gas probes throughout the SDDL site.

1.2.1 GEOLOGY, HYDROGEOLOGY, TOPOGRAPHY

The Dayton area is located within the buried pre-glacial valley system that underlies the present day GMR and its tributaries in southwestern Ohio. This pre-glacial valley system is knows as the Miami Valley Aquifer System. The regional overburden geology of the Dayton area consists of glacial tills and glaciofluvial sand and gravel deposits. Norris and Spieker (1966) defined the overburden units, based on general character and relative position as follows (from top to bottom):

- Ground Moraine (glacial till) – composed of silt, gravel and clay; found primarily in the uplands areas (not present at the Site);
- Upper Aquifer Zone – the saturated glaciofluvial sand and gravel zone located above a major till-rich zone;
- Till-Rich Zone – composed of discontinuous fine-grained glacial till and other fine-grained materials with substantial components of sand and gravel;
- Lower Aquifer Zone – the glaciofluvial sand and gravel zone located beneath the Till-Rich Zone.

The subsurface geology in the vicinity of the SDDL site consists of fill and waste underlain by glacial tills, and glaciofluvial sand and gravel deposits.

Norris and Spieker (1966) identified three principal hydrogeologic units in the Dayton area, as follows:

- Upper Aquifer Zone – the upper portion of the saturated glaciofluvial sand and gravel facies;
- Till-Rich Zone – a zone of discontinuous, low permeability till facies interspersed with sand and gravel facies which act as an aquitard in some areas;
- Lower Aquifer Zone – the lower portion of the saturated glaciofluvial sand and gravel facies.

The subsurface hydrostratigraphy in the vicinity of the SDDL site is consistent with the regional geology of the Miami Valley Aquifer System with the exception that the Till-Rich Zone is highly discontinuous beneath the SDDL site. Monitoring wells installed on the SDDL site are screened in sand and gravel deposits above approximately 675-ft above mean sea level (AMSL). These deposits appear to be representative of the Upper Aquifer Zone. Monitoring wells screened below 675 ft AMSL appear to be representative of the Lower Aquifer Zone. Due to the stratigraphic variation of the Till Rich Zone both vertically and laterally, the implied 675 ft AMSL boundary between the Upper and Lower Aquifer Zones is approximate and may vary in elevation across the Site.

Groundwater flow in the Upper Aquifer Zone is influenced by the presence of the GMR to the north and west of the Site. Shallow groundwater (i.e., Upper Aquifer Zone) typically flows radially towards the GMR. However, during extended periods of high flow in the GMR, groundwater flow slightly to the southeast has been documented. Basically, the stage of the GMR determines whether it is a gaining (effluent) or losing (influent) stream. For example, during flood events, groundwater flow is occasionally reversed and migrates from the GMR to the Site and the SSDL site.

Groundwater flow in the Lower Aquifer Zone is predominantly to the southwest in the area, with occasional slight southeasterly components, and is not significantly affected by the GMR. However, in areas where the intermediate till rich zone is absent, the upper and lower aquifer are in direct communication and the stage of the GMR will affect the flow in the lower aquifer zone. The groundwater level elevation in the vicinity of the Site is reported to between 700 and 725 AMSL at the Site.

A heavily vegetated man-made embankment is present along the northern and western boundary of the Site, along the GMR. The grassy area between the berm and the GMR is part of the 100-year floodway and is owned by the MCD. The topography of the Site is fairly level, due to grading activities. The largest stockpile, a recycled asphalt product (RAP) pile, rises approximately 40-feet above the ground surface. A paved roadway provides access from Dryden Road and along the northern portion of the Site. A majority of the Site's land surface is covered with stockpiles of raw materials.

The topography of the SDDL site is variable with embankments along the Great Miami Recreational Trail, an unpaved access road, a depressed area, several mounded areas of fill, a ravine and a low-lying area along the entire southern portion of the SDDL site.

1.3 SITE HISTORY

From 1941 until 1993 various members of the Boesch and Grillot families owned the Site (and to the present, own a majority of the SSDL site) where waste disposal

activities were conducted. The majority of the properties that comprise the SDDL site were acquired over time by Horace Boesch and Cyril Grillot.

The landfill operated from the early 1940s to 1996 and is partially filled sand and gravel pit. The landfill contains household waste, drums, metal turnings, fly ash, foundry sand, demolition material, wooden pallets, asphalt, paint, paint thinner, oils, brake fluids, asbestos, solvents, transformers and other industrial materials known to have been brought to the SDDL site. As the excavated areas of the SDDL site were filled, some of the property was sold and/or leased to businesses along Dryden and East River Roads. Valley purchase Parcel 5054, consisting of approximately 10– acres, in 1993. The Miami Conservancy District owns the southern part of the SDDL site.

Disposal of waste materials began at the SDDL site in the early 1940s. Materials dumped at the SDDL site included drummed wastes. Known hazardous substances were brought to the SDDL site, including drums containing hazardous waste from nearby facilities. Some of the drums contained cleaning solvents (1,1,1-trichloroethane [TCA], methyl ethyl ketone [MEK], and xylenes); cutting oils; paint; Stoddard solvents; and machine-tool, water based coolants. The SDDL site previously accepted materials including oils, paint residue, brake fluids, chemicals for cleaning metals, solvents, etc. Large quantities of foundry sand and fly ash were dumped at the SDDL site. Asbestos was also reportedly dumped at the site.

EPA conducted a screening site inspection of the SDDL site in 1991. OEPA conducted a site team evaluation prioritization of the landfill in 1996. In 2002, EPA conducted an aerial photographic analysis of the SDDL site.

In 1991, four underground storage tanks (USTs) were removed from the Site. Two 4,000-gallon steel USTs contained waste oil and gasoline, respectively. Two 3,000-gallon USTs contained diesel and kerosene, respectively.

In 2000, Valley Asphalt removed five drums containing characteristic hazardous waste, PCBs, VOCs and 2,217 tons of contaminated soils from the northern area of the Site that were uncovered during the excavation for a sewer line.

EPA proposed the SDDL site to the National Priorities List (NPL) in 2004. In 2008 to 2010, others completed several investigations at the SDDL site, including geophysical surveys, test pit and test trench sampling, vertical aquifer sampling, landfill gas sampling and groundwater monitoring well installation and sampling. From these investigations, the EPA determined that the groundwater beneath portions of the SDDL site contains vinyl chloride, TCE, 1,2-DCE, arsenic, lead and other chemicals. Based on the investigations, the remedial work to be completed on the SDDL site was divided into two parts. The remedial strategy for Operable Unit One (OU1), which is shown on Figure 1.2 and outlined in red, is expected to involve evaluating cleanup alternatives to address 55-acres of the landfill. Valley's Site lies within OU1 and the cleanup alternatives that are being considered will allow Valley to remain operating safely. In 2012, EPA, in consultation with OEPA, determined that additional data must be collected on groundwater and potential hot spots before selecting a remedy for OU1. Additional investigation and remedy evaluation is ongoing.

1.3.1 SITE HISTORY –VAPOR INTRUSION SAMPLING

Exterior Sampling Activities

In 2009 and 2010, others collected soil vapor samples from three permanently-installed soil vapor probes located on the Valley Site. Each soil vapor probe was located in exterior areas (as opposed to interiors of buildings). The samples were submitted to an accredited laboratory and analyzed for VOCs by EPA Method TO-15. Others compared the soil vapor sample results to generic soil vapor screening levels that were derived by applying the EPA Region 5 Guidance (EPA, 2010) default soil gas-to-indoor air attenuation factor of 0.1 to the EPA indoor air regional screening levels (RSLs). The VOCs detected in soil vapor samples at concentrations greater than the generic soil vapor screening levels were 1,1-dichloroethane (DCA); 1,1-dichloroethene, benzene; chlorobenzene; ethylbenzene; tetrachloroethene (PCE); vinyl chloride, trichloroethene, and total xylenes. Exceedances of the generic soil vapor screening levels occurred at all three of the permanently-installed Valley Site soil vapor probes.

Others completed field screening for methane at the exterior soil vapor probes in 2009. The soil vapor methane concentrations were compared to the upper explosive limit (UEL)(15 percent methane) and Lower Explosive limit (LEL)(5 percent methane) for methane. Methane concentrations were greater than 10 percent of the LEL (0.5 percent methane) at one of soil vapor probe locations on the Valley Site (Building 2).

Interior Sampling Activities

Indoor air and sub-slab sampling locations are summarized below.

Building 1

On August 6, 2012, the chemical trichloroethene (TCE) was observed in a sub-slab sample collected in Building 1 at a concentration of 2,700 ppbv. This result exceeds the ODH TCE sub-slab screening level of 20 ppbv. The chemical TCE was also observed in an indoor air sample at a concentration of 8.1 ppbv. This result exceeds the ODH TCE indoor air screening level of 2 ppbv. These results confirm that vapor intrusion is occurring in Building 1. The U.S. EPA and ODH have concluded that there is a potential public health threat posed by TCE vapor intrusion.

Building 2

On March 13, 2012, 6.6% methane was observed in a sub-slab sample collected from Building 2. This result exceeds the ODH methane screening level of 0.5%. While methane was not detected in the indoor air of Building 2, the U.S. EPA and ODH have concluded that there is a potential explosion hazard beneath this building because methane is explosive between 5 and 15%.

Building 2 is currently closed to access. In January 2012, appropriate notifications of the exceedance of the methane LEL were provided to EPA, OEPA, representatives of the Public Health - Dayton and Montgomery County (PHDMC), the City of Moraine Fire Division², and the Moraine Police Division. Others manually measure the indoor air and sub-slab methane concentrations at this building on a weekly basis to ensure that methane concentrations do not increase and that methane is not

migrating from beneath the slab into the building. On January 24, 2013, one Sierra Gas monitor (model 2001) was installed in Building No. 2. At the present, others have proposed to install a battery back-up unit for the gas monitor. Once the battery back-up unit has been installed, weekly manual methane readings by others will be discontinued. Valley will conduct weekly checks of the gas monitor to ensure that it is operational and that sub-slab and indoor air methane levels are within acceptable ranges. The results of these checks will be documented on the Methane Monitoring log, included in Appendix B.

Building 4

In 2012, the chemical TCE was observed in 4 different sub-slab samples collected in Building 4. TCE concentrations ranged from 46 to 200 ppbv, which all four exceed the ODH TCE sub-slab screening level of 20 ppbv. The chemical TCE was not observed in the indoor air samples collected in Building 4 at concentrations greater than the ODH TCE indoor air screening level of 2 ppbv. These results show that at the time of each sampling event in 2012, vapor intrusion has not been documented in Building 4, but that there is the potential for vapor intrusion to occur in the future.

Although the compound acetaldehyde was detected in two indoor air samples at concentrations greater than the acetaldehyde ODH indoor air screening level, this compound was not detected in the co-located sub-slab soil vapor samples, indicating that the indoor air concentrations are not due to vapor intrusion.

Building 5

In 2012, the chemical TCE was observed in 3 different sub-slab samples collected in Building 5. TCE concentrations ranged from 240 to 700 ppbv, which all three exceed the ODH TCE sub-slab screening level of 20 ppbv. The chemical TCE was not observed in the indoor air samples collected in Building 5 at concentrations greater than the ODH TCE indoor air screening level of 2 ppbv. These results show that at the time of each sampling event in 2012, vapor intrusion has not been documented in Building 5, but that there is the potential for vapor intrusion to occur in the future.

Building 6

In January and April 2012, CRA conducted field screening for methane in building 6. At each sampling event, CRA did not observe any methane detections beneath the subslab. Based on the field screening results collected from Building 6, the U.S. EPA will require sub-slab probe installation and TO-15 (VOC) analysis to determine if the building requires mitigation.

Building MP

On August 6, 2012, the chemical tetrachloroethene (PCE) was observed in an indoor air sample collected from the crawl space in Building MP at a concentration of 38 ppbv. This result exceeds the ODH PCE indoor air screening level of 25 ppbv. This result confirms that vapor intrusion is occurring in Building MP. Based on the PCE laboratory results of the indoor air (crawl space) sample collected from Building MP, the U.S. EPA and ODH conclude that there is a potential public health threat posed by PCE vapor intrusion.

The maximum sub-slab and indoor air concentrations (ppbv unless otherwise stated) that were greater than the ODH screening levels (ppbv unless otherwise stated) for each building sampled in 2012 are presented in Table 2.

TABLE 2

HISTORIC SUB-SLAB AND INDOOR AIR SAMPLING RESULTS

Building Number	COC	Max Sub-Slab Concentration (ODH Screening Limit)	Max Indoor Air Concentration (ODH Screening Limit)
1	TCE	2,700 (20)	8.1 (2.0)
2	TCE	32 (20)	No exceedances
	Methane	6.6% (0.5%)	
4	TCE	200 (20)	No exceedances
5	TCE	700 (20)	No exceedances
6	No monitoring known to have performed to date	No monitoring known to have performed to date	No monitoring known to have performed to date
7	No monitoring performed to date	No monitoring performed to date	No monitoring performed to date
MP	PCE	No monitoring performed to date	38 (25)

2.0 SITE MOBILIZATION

2.1 HEALTH AND SAFETY PLAN

A Health and Safety Plan (HASP) has been established for this Site and is included in Appendix C. The HASP is a “living document” and procedures will be updated if additional information is discovered which requires alteration of the plan.

Site control measures are addressed as Section 5.11 of the HASP.

Sanitary facilities (i.e., Porta-Potty) are available near Building 4. A map to the hospital is posted on the inside of the primary man-door leading into Building 4. First aid kits are available in Building 4 and in Building 5. Nearby Weston offices (711 East Monument Avenue, Dayton, Ohio) will be available for meetings and emergency response.

2.2 PRE-WORK MEETING

A pre-work meeting will be held between Valley, EPA On-Scene Coordinator (OSC), ODH Licensed Radon contractor, and the other contractors to discuss this work plan, once approved by EPA. All participants will read and formally acknowledge the provisions of the HASP before initiating on-Site work. The following topics may be discussed in detail: provisions for Site security, mobilization, emergency procedures, delegation of responsibilities, and channels communication.

2.3 EMERGENCY PROCEDURES

Emergency procedures have been established for this Site. Emergency procedures provide specific guidelines and establish procedures for the protection of personnel in the event of an emergency. The emergency procedures included as Section 5.8 – 5.10 of the HASP.

3.0 SAMPLING ACTIVITIES

A Quality Assurance Project Plan (QAPP) has been established for this Site, to ensure data collected during sample activities are reliable. A copy of the QAPP is included in Appendix D.

Field sampling activities required by the UAO will be completed in accordance with the sampling procedures, sampling plan, and associated analysis detailed below and in accordance with EPA-issued guidance documents.

Gas sampling activities may include one or more of the following: sub-slab soil vapor, ambient air, and/or indoor air samples. Gas samples will be collected, analyzed, and evaluated in accordance with the following procedures. Gas samples will be analyzed for the parameters included in the TO-15 list of analytes. All existing sub-slab soil vapor and indoor air sample locations for all on-Site buildings that require mitigation are presented on Figures 3.1 to 3.7.

3.1 SAMPLE COLLECTION

A sub-slab probe will be installed in Building 6. This probe will be installed and sampled in accordance with the EPA Response Engineering and Analytical Contract (REAC) SOP#2082 (Appendix J). The results of that investigation will determine whether mitigation of Building 6 is indicated.

Mitigation has been ordered for Buildings 1, 2, 4, 5, 7 and MP via the UAO. Valley has chosen to totally demolish Buildings 1, 7 and MP and to demolish the front (office) portion of Building 2. Therefore, mitigation, including sample collection, will be performed on Buildings 4 and 5 and the back (storage) portion of Building 2.

All SUMMA canisters used for indoor air sampling will be individually certified and all sub-slab samples will be batch certified (industrial and commercial buildings) by the analytical laboratory to ensure they are free of contamination before collecting the samples.

During sample collection, Valley will check each SUMMA canister periodically to ensure that the canister pressure has not reached zero; at a minimum, the canisters will be checked several hours before the end of the sampling period. In accordance with the sub-slab soil vapor sampling protocol (FSP), some residual vacuum should be left in each canister following sample collection. A minimum 1" Hg residual vacuum will be required for the sample to be considered valid, or the sampling will be repeated using a fresh SUMMA canister. In some instances, the canister pressure may decrease to below 5" Hg in less than the target amount of time. A SUMMA canister may be closed and sampling ended once the vacuum decreases below 5" Hg provided that at least 75 percent of the targeted sample time (i.e., 45 minutes for a 1-hour sample, 6 hours for an 8-hour sample, and 18 hours for a 24-hour sample) has elapsed. Provided the residual vacuum is a minimum of 1" Hg and the sample duration was at least 75 percent of the target duration, the sample will be considered a valid sample.

The target maximum residual vacuum is 5 inches of mercury (" Hg). If, after the required duration of sample collection (i.e., 8 hours for commercial and 24 hours for residential properties), the vacuum has not reached 5" Hg, the canister valve may be closed once the vacuum reaches a minimum of 10" Hg, as long as the specified duration of sample collection (i.e., 8 or 24 hours) has elapsed. This will be considered a valid sample.

If the vacuum has not reached 10" Hg and access to the building is ending for the day, Valley will notify EPA. If building access is provided for the following day, close the sample valve and record the canister vacuum and date. Return the following day, record the canister vacuum and date and complete sample collection. If building is not available for the following day, check with the laboratory if detection limits can be met and end sampling. If the detection limits cannot be achieved, re-sampling will be required.

A summary of the acceptable sample canister end pressures and times is provided in the following table:

TABLE 3

SUMMA CANISTER SAMPLING PROCEDURES

<i>Duration of Sampling</i>	<i>Sample Canister Vacuum</i>	<i>Required Procedure</i>
Less than 6 Hours	Less than or equal to 5" Hg	Invalid sample. Collect new sample with new canister.
More than 6 Hours	Less than or equal to 5" Hg	Acceptable sample. End sampling.
Less than 8 Hours	Less than 10" Hg	Continue sampling until vacuum reaches 5" Hg, or 8 hours have elapsed, whichever occurs first.
More than 8 Hours	Greater than 10" Hg	End sampling when vacuum reaches 10" Hg.
Building access issues necessitate an end to sampling	Greater than 10" Hg	Notify EPA. Check if building access is available the next day. If building access is available the next day: Record canister end vacuum and date, close sample valve. Record day 2 canister start vacuum and date, continue sample. If building access is not available the next day: end sampling and check with laboratory if required detection limits can be met.

In accordance with the SOPs, canisters will be labeled noting the unique sample designation number, date, time, and sampler's initials. A bound field logbook will be maintained to record all sampling data. The unique sample designation numbers will have the following format:

MC -38443-MMDDYY-XX-Nn

Where:

- MC (Matrix Code) – Designates sample type (SS - sub-slab soil vapor; IA - indoor air; OA - outdoor air; CS - crawl space)
- 161803 – Project reference number
- MMDDYY – Designates date of collection presented as month, day, year
- XX – Sampler's first and last initials
- Nn – Building number followed by sample location

Details of the sampling will be recorded within a standard field book and on an

Air Sampling Field Data Sheet Details should include:

- SUMMA canister, flow controller and pressure gauge IDs
- Sample start time and initial SUMMA canister pressure
- Outside temperatures and barometric pressures
- PID readings within the building
- Helium leak test concentration
- Sample end time and final SUMMA canister pressure
- Unique sample designation number

If requested, a sub-slab sample and/or indoor air sample will be collected where any new locations that may be identified as requiring sampling. Sub-slab samples will be collected from the soil vapor located beneath the concrete slab beneath the lowest level of the building.

Sampling will not be performed during storm events or within 48 hours of a significant rain event (i.e., greater than 1 inch of rain in a 24-hour period) because of the potential influence such conditions may have on indoor air, outdoor air, and sub-slab soil vapor. Information on weather conditions (including barometric pressure, air temperature, wind direction, and wind speed) in Moraine, Ohio, during the sampling event will be obtained from Weather Underground's website. In fine-grained soil conditions, consideration will be given to allowing a greater amount of time for rainfall events to dissipate. The vadose zone soil types at the site are mainly sand and gravel fill, with some silt and clayey silt. Valley field technicians, in consultation with EPA oversight consultants, will determine if more than 48 hours should be allowed to elapse following a significant rain event for probes in areas of fine grained soils.

3.2 MITIGATION SYSTEM SAMPLING

3.2.1 PROFICIENCY AIR SAMPLING

To verify that the mitigation systems are operating to reduce indoor air concentrations of VI contaminants to less than applicable criteria, Valley will complete post-installation proficiency air sampling at 30 days, 180 days and 1 year following

SSDS installation. The post-installation proficiency sampling will be comprised of three elements:

- a. Collection and analysis of indoor air samples from each building mitigated;
- b. Collection and analysis of outdoor samples adjacent to each building mitigated;
- c. Collection and analysis of SSDS effluent samples from each building mitigated; and
- d. Collection and analysis of sub-slab samples from each building mitigated.

Valley will collect air samples from the locations listed in Table 3, following system installation. Should the proposed sub-slab gas survey for Building 6 indicate that mitigation is necessary, that system will be included in the proficiency air sampling program.

TABLE 4
BUILDINGS REQUIRING MITIGATION AND PROFICIENCY SAMPLING

<i>Parcel / Map Building Number</i>	<i>Address</i>	<i>Current Use</i>
5054/2	1903 Dryden Road	Storage
5054/4	1901 Dryden Road	Asphalt Plant control building
5054/5	1901 Dryden Road	QA Building

3.2.1.1 INDOOR AIR PROFICIENCY SAMPLING

Valley will collect indoor air proficiency samples from all buildings in which SSDSs have been installed 30-days, 180-days and 1 year after installation of the SSDS. Beginning in the second year after installation of the mitigation systems, Valley will complete annual indoor air proficiency sampling at a subset of 20 percent of operating systems, equivalent to 1 sample, at a location approved by EPA prior to scheduling of the sampling for as long as the SSDSs remain operational. During the first year of the annual indoor air proficiency sampling program, Valley will collect the indoor air proficiency samples in the building with the greatest sub-slab soil vapor or indoor air concentrations.

During subsequent years, Valley will propose locations and provide a rationale for sampling at the proposed locations for EPA approval prior to collecting the samples. Proficiency air sampling will continue until EPA notifies Valley that work is complete. Valley will provide the results and corresponding evaluation after each sampling event to EPA within 30 days of receiving the complete set of final analytical data.

In the event that proficiency air sampling indicates the system has not reduced or maintained concentrations below the applicable indoor air or sub-slab screening levels, a Corrective Action Plan will be submitted to EPA within 30 days. Corrective actions will include evaluation of the performance of the SSDS and completion any necessary system modifications. System modifications may include adding an additional extraction point(s), modifying the SSDS to an intrinsically safe SSDS (if methane is observed above the sub-slab or indoor air screening level), sealing cracks in the floors, and/or sealing or fixing drains or sub-slab sampling. All system modifications will be pre-approved by EPA prior to implementation. Following completion of system modifications, Valley will complete a follow-up indoor air and sub-slab sampling event within 30 days of completion of system modifications.

The proficiency sampling events will be performed by at least two Bowser Morner field staff and are anticipated to take approximately 1 week for each of the 30-day, 180-day, and 1-year sampling events. Valley will provide EPA with email notification regarding scheduling, a minimum of 2 weeks in advance of proficiency sampling events.

3.2.1.2 OUTDOOR AIR SAMPLING

Outdoor air sampling will be performed concurrently with indoor air sampling. Where samples are collected from adjacent or nearby buildings, one outdoor air sample may be sufficient for comparison to the indoor air sample results from more than one building.

3.2.1.3 SSDS EFFLUENT SAMPLING

Immediately following installation of the SSDSs, Valley will collect one grab air sample of the effluent from the SSDS located in Building 2, which currently contains the highest sub-slab soil vapor concentrations of TCE. The sample will be collected and analyzed in accordance with procedures detailed below.

3.2.1.4 SUB-SLAB PROFICIENCY SAMPLING

Immediately following installation of the SSDSs, Valley will collect one sample from the sub-slab port in each building with an SSDS. The sub-slab samples will be collected over an 8-hour time period. Sub-slab sampling will be performed concurrently with indoor air sampling at 30-days, 180-days and 1-year following installation of the SSDS. The samples will be collected and analyzed in accordance with procedures detailed in Sections 3.4 and 3.6 below.

3.2.1.5 DE MINIMIS EFFLUENT AIR SAMPLING

On May 13, 2013, Katherine Beach of Bowser Morner discussed *de minimis* emission and individual hazardous air pollutant (HAP) issues with Andy Roth of the Regional Air Pollution and Control Agency (RAPCA), by telephone and email.

Using conservative initial calculations provided by Andy Roth to Valeria Chan (of Conestoga Rovers & Associates) on January 14, 2013, a flow rate resulting in *de minimus* emissions was calculated. Based on the greatest sub-slab TCE concentration of 2,700 ppbv (measured in a sample collected from 1901 Dryden Road, Building 1), a total SSDS flow rate of 4,100 ft³/min or less conforms to the Ohio EPA *de minimis* HAP emission rate of one ton per year. Accordingly, provided the total SSDS flow rate is equal to or less than 4,100 ft³/min, and maximum sub-slab soil vapor TCE concentration does not exceed 2,700 ppbv, submittal of an air permit application or performance of effluent air sampling is not required by RAPCA. In accordance with EPA's request to others to collect an annual sample of the effluent from the SSDS at the location with the highest sub-slab soil vapor concentrations of TCE, Valley will do the same.

Immediately following installation of the SSDSs, Valley will collect one air grab sample from the discharge sampling port(s) (i.e., each location where there is a fan/blower) of the building with the greatest sub-slab TCE concentration (i.e., Building 2) annually. The sample(s) will be collected and analyzed in accordance with procedures detailed in Section 3.6 below. In addition, Valley will collect one de minimis air sample annually from the building with the greatest sub-slab TCE concentration (based on the most recent sample results available at the time), for the duration of system operation.

In addition to the collection of air samples, velocity readings will be measured at each exhaust pipe with a velocity meter. Flow rates will be calculated for each emission discharge point. The flow rate and analytical data will be used to calculate the approximately daily, monthly, and yearly emission amounts. As a conservative measure, the preliminary calculations will assume that all buildings discharge at the same rate as the worst-case building.

The effluent air sample results will be compared to State of Ohio de minimis levels, documented in Ohio Administrative Code 3745-15-05, to determine if other regulatory requirements apply.

3.3 INDOOR AIR SAMPLING

As noted in Section 3.2.1 above, indoor sampling will be performed in accordance with the SOP for indoor and outdoor air sampling. For buildings to be mitigated that have an area less than 1,500 square feet; only one indoor air sample will be collected. For buildings with areas greater than 1,500 square feet, one or more indoor air samples will be collected.

In June 2011, December 2011 and July 2012, representatives of CH2M Hill, OEPA, Valley and CRA completed building surveys at the parcels associated with the SDDL. The building surveys were completed in order to gather the information necessary to develop VI-specific CSMs for each VI Study building. The building survey included collection of data related to indoor air quality such as use or storage of cleaning

products, paints, and/or petroleum hydrocarbon products, aerosol consumer products, smoking, etc.

Before sampling, the buildings will be resurveyed to determine if conditions have changed since the building surveys. Undifferentiated VOC concentrations will be measured using a ppbRAE®, or equivalent, and recorded during the building resurveys to identify potential indoor air sources or the general location of potential indoor air sources. Where possible and reasonable, the indoor air sources will be removed or containerized from the buildings prior to proficiency air sampling. The Building Physical Survey Questionnaire (Form 1) will be updated as necessary for each building. The completed Building Physical Survey Questionnaires for the buildings requiring mitigation are provided in Appendix E. The Building Physical Survey Questionnaire Form 1 is provided in Appendix H1.

Typically, the intake point of the indoor air sample canisters will be located at the breathing zone height, between approximately 3 to 5 feet (1 to 1.5 meters) above floor level, in the lowest level of the property (i.e., basement or first floor for slab on grade buildings). Valley will situate the indoor air sample canister as close as practical to the location of the original indoor air samples collected during the 2012 Vapor Intrusion Investigation. Valley will endeavor to situate the canisters in areas that are not subject to disturbances or locations that interfere with the occupants' operational activities which may lead to a false indication of an indoor air issue. Valley will collect indoor air samples at the actual or contingency indoor air locations specified in the figures for buildings with installed active SSDSs (Figures 3.1 through 3.7).

When indoor air samples are collected, Valley will also collect an outdoor air sample in the vicinity of the structure, as per Valley's SOP. Where samples are collected from adjacent or nearby buildings, one outdoor air sample may be sufficient for comparison to the indoor air sample results from more than one building.

Information on weather conditions (including barometric pressure, air temperature, wind direction, and wind speed) in Dayton, Ohio during the sampling event

will be obtained from the National Weather Service Forecast Office or National Climatic Data Center website.

3.4 SUB-SLAB SOIL VAPOR PROBE SAMPLING

Sub-slab soil vapor probe installation and sampling, will be performed in accordance with the REAC SOP or by using vapor pins. For Buildings 4 and 5, with a surface area less than 1,500 square feet; only one sub-slab port exists and will be tested. The back (storage) portion of Building 2 consists of approximately 3,500 square feet and currently contains a single sub-slab port. Depending on the SSDS design selection, up to six additional sub-slab ports may be installed and sampled.

Valley will complete leak testing prior to sub-slab soil vapor probe sample collection by injecting helium into a shroud covering the sub-slab probe, and monitoring for the presence of helium in the purged sub-slab soil vapor using a field meter.

Valley will purge stagnant air from the sub-slab soil vapor probes into Tedlar bags using a lung box sampler and pump. Valley will purge one to two liters of sub-slab soil vapor from the probe assembly, into a Tedlar bag. One liter of sub-slab soil vapor will be greater than three volumes from the sub-slab soil vapor probe assembly (probe and attached Teflon® tubing). This ensures that the sub-slab soil vapor sample is representative of actual vapor concentrations within the sub-slab bedding material.

In order to assess susceptibility of soil gas entry into a building, Valley will use a ppbRAE (or equivalent) and LandTec GEM 2000, or equivalent, to directly survey preferential pathways for vapor migration (i.e. utility penetrations, cracks, sumps, floor drains, earthen floors, etc.). Readings will be recorded on the Air Sampling Field Data Sheet (Appendix L).

Information on weather conditions (including barometric pressure, air temperature, wind direction, and wind speed) in Dayton, Ohio during the sampling event will be obtained from the National Weather Service Forecast Office or National Climatic Data Center website and will be recorded on the Air Sampling Field Data Sheet.

3.4.1 SUB-SLAB SOIL VAPOR PROBE SAMPLING FOR METHANE

Following purging and leak checking of the sub-slab soil vapor probe, Valley will collect a second Tedlar bag sample of sub-slab soil vapor to measure post-purge/pre-sample values of methane, lower explosive limit (LEL), oxygen, and carbon dioxide, using appropriate meters. The Tedlar bag will be field screened and emptied outside the building to avoid releasing contaminants within the building. The information will be documented on the Air Sampling Field Data Sheet.

The required sub-slab soil vapor samples will then be collected into 6-Liter SUMMA Canisters. Following sample collection, Valley will collect sub-slab soil vapor from the probes into Tedlar bags with a lung box sampler and pump in order to measure post-sample methane, carbon dioxide, and oxygen values.

The following information from the EPA (2005) Guidance for Evaluating Landfill Gas Emissions from Closed or Abandoned Facilities will be considered when selecting times for measuring methane levels: "Highest methane concentrations occur in the warmer summer months, and concentrations are higher during the heat of the day compared to measurements taken during morning hours. Landfill gas levels in soils tend to be higher during dry periods and lower after significant rainfall events."

Total VOCs in sub-slab soil vapor will be measured with a photoionization detector (PID) each time the methane, carbon dioxide, and oxygen concentrations are measured at each probe.

Valley will measure the levels of methane, carbon dioxide and oxygen using a portable combustible gas meter, specifically LandTec GEM 2000, or equivalent. Valley will measure filtered and unfiltered combustible gases with the LandTec GEM 2000. The LandTec GEM 2000 filtered measurements will be collected using a charcoal carbon filter. LandTec GEM 2000 reports the concentration of methane in units of percentage of the LEL of methane (i.e., 0 to 100 percent of LEL). The LandTec GEM 2000 measures the concentrations of oxygen, carbon dioxide, and carbon monoxide. The greatest values obtained during sampling will be recorded.

To confirm detections of methane using field instruments, separate sub-slab soil vapor or indoor air samples collected in SUMMA canisters will be submitted for analysis of fixed gases (methane, ethane, and propane) by ASTM Method D1946. The confirmatory samples will be used to verify the detected methane readings measured with the field meters. If methane concentrations in indoor air are measured with the field meter above 25 percent of the lower explosive limit (i.e., 1.25% methane), an immediate or rapid response will be necessary to eliminate the explosive hazard and confirmatory laboratory samples aren't necessary.

3.5 QUALITY ASSURANCE / QUALITY CONTROL SAMPLES

Field duplicate samples will be collected at a frequency of 10 percent per sample media for VOC analysis. The sample media are (1) sub-slab soil vapor and (2) indoor air and outdoor air. Duplicate samples will be collected in the same manner and from the same location as the normal samples are collected. A stainless-steel T-connector will be used to connect two SUMMA canisters together so the parent and duplicate sample are collected concurrently from the same intake.

Quality assurance (QA)/quality control (QC) for the methane field screening results will be accomplished by: 1) measuring methane twice, at least 8 hours apart, at each sub-slab soil vapor and indoor air sample location; 2) submitting 20 percent of the sub-slab soil vapor SUMMA canisters and 20 percent of the indoor air SUMMA canisters for laboratory analysis of methane by ASTM Method D1946.

EPA reserves the right to collect split sub-slab or side-by-side indoor air for any sample collected at the Site. The split samples will be collected in the same manner as duplicate samples.

3.6 SAMPLE ANALYSIS

The sub-slab, indoor air and outdoor air samples for VOC analysis will be collected in 6-liter SUMMA canisters equipped with flow controllers set to collect the samples over an 8-hour period for industrial and commercial buildings.

The SSDS effluent grab samples for VOC analysis will be collected in 1-liter SUMMA canisters. Grab samples will be collected directly from the SSDS effluent sample ports of the building with the greatest sub-slab TCE concentration (based on the most recent sample results available at the time), for the duration of system operation. At each sampling port location, the male plug will be removed and silicon tubing will be attached to the sampling port and replaced with a male fitting with silicon tubing. The fitting will be attached from the SSDS regulator to the tubing attached to the sample port. The SUMMA canister will be attached to the regulator. The sample port will be closed when the vacuum reading is between -10 to -1 "Hg. The grab sampler will be removed from the SUMMA canister; the fitting/tubing will be removed from the sample port and regulator. The male plug will be resecured to the sample port.

Valley will submit SUMMA canister samples under chain of custody protocols to the laboratory for VOC analysis in accordance with EPA Method TO-15. The full TO-15 list will be reported for each sample. If required, to confirm detected methane field readings, samples collected in SUMMA canisters will be submitted for analysis of fixed gases (methane, ethane, propane) by ASTM Method D1946. EPA may request split samples at any sample location.

3.7 CLEANUP CRITERIA

Valley will evaluate analytical results against ODH indoor air and sub-slab soil gas screening levels for non-residential locations (Appendix K). ODH screening levels for naphthalene were provided by electronic mail (email) on September 13, 2012. Revised ODH screening levels to correct the indoor air non-residential values for o-xylene were issued on October 9, 2012.

Valley will design and install a vapor mitigation system in non-residential (commercial) structures impacted by subsurface gas migration, if the concentration(s) of COCs are greater than ODH sub-slab or indoor air screening levels and the presence of the COC is determined to be a result of vapor intrusion.

4.0 MITIGATION PLAN

One of the primary objectives of the VI Mitigation Activity is to design and install a vapor mitigation system in on-Site non-residential (i.e., commercial) structures impacted by subsurface gas mitigation, if the concentration(s) of COC(s) exceed ODH sub-slab or indoor air screening levels and the presence of the COC(s) is determined to be a result of vapor intrusion. Section 4.6 presents a summary of all buildings sampled during the VI Investigation and the associated mitigation decisions. The “Mitigation Summary Database” Excel file used to track the progress of mitigation is a living document, and the version current as of the date of Work Plan, is included as Appendix F. This document will be updated as needed throughout the VI Mitigation Activity in order to reflect the status of the mitigation and any new information received.

Valley proposes to demolish Building 1, the brick front office space associated with Building 2, Building 7 and the MP Building following results of asbestos and lead sampling. Demolition will follow local codes/permits including management of debris. Therefore, Valley will focus mitigation activities on the back (storage) area of Building 2 and on Buildings 4 and 5. Currently, mitigation activities are not planned for Building 6; sub-slab monitoring will determine the appropriate course of future action.

Beginning on May 2, 2013, EPA, EPA’s START contractor, Valley and Bowser Morner will participate in weekly update conference calls regarding the Mitigation Summary Database and next steps. Appendix G presents the meeting agenda and meeting minute templates for the weekly conference calls.

The abatement system will include installation of a SSDS, sealing cracks in walls and floors of the basement or lowest building floor, and sealing drains that could be a pathway. Building 2, the only structure with sub-slab methane concentrations greater than 0.5 percent by volume, will require an intrinsically safe SSDS. The selected intrinsically safe devices will be designed to prevent the release of sufficient energy, by either thermal or electrical means, to cause ignition of flammable gasses. The selected device(s) will bear the appropriate marking (Factory Mutual CSA, Ex, etc.). Active SSDSs will be designed and installed in the specified buildings to reduce potential indoor

air inhalation issues. This is achieved by creating a lower air pressure beneath the floor slab than above the floor slab. Valley will work closely with an ODH Licensed Radon Contactor who will be responsible for ensuring proper installation and operation of the systems. The scope of the work for the SSDSs will include:

Task 1 – Conduct a building inspection / engineering evaluation.

Task 2 – Design SSDS and submit designs to EPA for approval.

Task 3 – Install SSDS

Task 4 – Develop a Mitigation Proficiency Sampling Plan

Task 5 – Perform Proficiency Sampling and Annual Inspections/Maintenance.

4.1 TASK 1 – CONDUCT BUILDING INSPECTION AND ENGINEERING EVALUATIONS

Valley will review and confirm building plans and blueprints, if available, and conduct pre-design building inspections. This will include evaluation of the building layouts and construction components including HVAC, electrical and structural. Of particular interest are the building foundations, sub-slab layouts and orientations including materials of construction, utility connections and conduit layouts for future design purposes. Sealing of cracks may be completed at this stage, if appropriate.

4.2 TASK 2 – DESIGN SUB-SLAB DEPRESSURIZATION SYSTEM

The information obtained from the Building Physical Survey and sub-slab probe installation(s) will be used to prepare conceptual layout design drawings. The system design will include the number and location of extraction points, pipe routing, discharge point(s), fan location(s), and fan sizing. The basic design requirements will be prepared to a level acceptable for use for contractor bidding purposes. One or more contractors will participate in inspections of the buildings or, at the contractor's discretion, will agree to rely on inspections of the buildings completed by others. Following the building inspections, the contractor will prepare a Design Plan, which, after it is approved by Valley and Bowser Morner, will be submitted to EPA for approval prior to installation. The designs will be based on SDDL-specific instruction provided by EPA, industry standards, local code, and manufacturer information regarding equipment performance

for an active depressurization system. In this case, for buildings with areas less than 1,500 square feet, one SSDS will be installed. For buildings with areas greater than 1,500 square feet, one or more SSDSs and/or extraction pipes will be installed. The number of SSDS and/or extraction pipes will be dependant upon the building configuration and locations will be chosen to minimize disruption to business operations.

Following receipt of EPA approval, the contractors will proceed with the installation.

Following completion of the installation, a Mitigation System As-built Report will be submitted to EPA. This Mitigation System As-built Report will be included in the operation, maintenance & monitoring (OM&M) manual. These reports will contain the following information:

- Data from the vacuum-radius of influence testing, including sub-slab vacuum and flow measurements
- Figure(s) showing the number of extraction locations and performance monitoring points
- Figure(s) showing the route of the discharge piping system(s) and the location of the exhaust fan(s) for each building
- Identification of materials and equipment used for each system (piping, blower, sizing, vacuum monitoring, valving, etc.)
- Procedures for startup and performance testing following system installation.
- Operational goals and objectives including radius of influence and vacuum field monitoring point vacuums

An intrinsically safe system will be installed at properties which have methane beneath the sub-slab greater than 0.5 percent by volume.

A visual inspection will be completed to verify that no air intakes have been located near the proposed exhaust discharge point(s).

Following receipt of approval of the mitigation system design by EPA, Valley will solicit contractor proposals, and undertake contractor procurement. As noted above, the contractor will be a licensed ODH Licensed Radon Contractor. In the event that a design-build approach is adopted, Valley will solicit contractor proposals prior to commencing the design and will commence installation of the SSDS following receipt of approval from EPA.

4.3 TASK 3 – INSTALL THE SSDS

The SSDS in each building may consist of multiple vapor extraction points based on square footage and radius of influence testing. Either fan(s) or larger blower(s) connected to extraction point(s) will be installed outside the building, mounted directly on the system piping and fastened to a supporting structure by means of mounting brackets. The fan(s) or blower (s) will operate continuously to pull a vacuum from the vapor recovery point(s). The vapors will discharge to the outdoor air above the building roof and highest building window per local code. This will allow any VOCs present to dissipate more readily. As methane is lighter than air, discharging the gases above the roof top ensures that any methane that may be present will not create a localized explosion hazard near the ground surface where potential ignition sources could ignite it. A sample port and an air-velocity monitoring access point will be installed in the discharge pipe at least two feet away from any constrictions (i.e., bends, elbows, etc.) and after (i.e., above) the fan. A common external fuse panel will be considered to power the SSDS system(s). All exterior electrical panels must be weatherproof, must provide an uninterruptable power source, and be secured with a lock and tamper-proof box. Equipment used to install the SSDS beneath buildings where explosive gases are present in the sub-slab vapor at concentrations greater than 10 percent of the LEL or where no sub-slab explosive gas data are available will be intrinsically safe, because of potential explosive hazards.

Permanent vacuum monitoring points will be installed for each system, on the suction side of the fan. A permanent vacuum gauge will consist of a “U-tube” manometer, or similar device, with a minimum vacuum of 1 inch of water. The

permanent vacuum monitoring points will document that the sub-slab beneath the entire building has been depressurized. Valley will verify that manometer vacuum is in the range of 1 or 4 inches of water ("w.c."), and will mark the operating vacuum on the manometer. The vacuum will be set to the minimum required to depressurize the entire slab and is expected to be in the range of 1 or 2" w.c. The number of vacuum monitoring points will be determined during the design process.

Following the installation of the SSDSs, the radius of influence of each system will be checked using a digital manometer to determine if a vacuum is applied across the entire building slab. The digital manometer can be used at the sub-slab soil vapor probe locations, provided that they are located on opposite sides of the slab from the suction point. Additional sub-slab depressurization points and monitoring points can be installed if the resulting vacuum proves insufficient or more monitoring points are required.

EPA 2008 guidance document titled "Indoor Air Vapor Intrusion Mitigation Approaches" states that the generally accepted target range for depressurization is 4 to 10 pascals or 0.0161 to 0.04" w.c., with a nominal continuous operating range of depressurization from 0.025 to 0.035" w.c. for standard permeability sub-slab material. However, differential pressure ranges as low as 0.001" w.c. are sufficient to effectively depressurize a sub-slab, according to EPA 1993 guidance "Radon Reduction Techniques for Existing Detached Houses: Technical Guidance for Active Soil Depressurization Systems".

If the digital manometer shows a vacuum reading of negative 0.004" w.c. below the slab, then there are sufficient indications that the active system is successfully depressurizing the sub-slab area across the footprint of the building. During the operation and monitoring of the SSDSs, Valley will compare the vacuum measurements to the appropriate ranges, and if necessary, make adjustments to the SSDSs.

The following information will be recorded to define the operating performance of the SSDSs:

- Location of the sub-slab sample points

- Initial sub-slab pressure field measurements
- Static pressure at each permanent vacuum monitoring point (U-tube manometer readings)
- Static pressure at the fan inlet
- Photos of the SSDS header and fan

Valley will annually check the system components following completion of system installations. If Valley notices damage to the SSDS or the system is not functioning within the range marked on the permanent vacuum monitoring points, they will call a Bowser Morner contact. Labels on the system components will list a telephone number for a Bowser Morner contact.

Any gaps around the extraction point penetration and utility penetrations through the foundation floor will be appropriately sealed. Other opening and cracks in the foundation will be sealed where necessary and feasible.

As specified in Section 3.2.1.3 above, Valley will collect an effluent air sample from the extraction pipe of the building with the greatest sub-slab TCE concentration on an annual basis. The effluent air sample results will be compared to State of Ohio de minimis levels, documented in OAC 3745-15-05, to determine if off-gas treatment is required.

4.4 TASK 4 – DEVELOP A MITIGATION PROFICIENCY SAMPLING PLAN

A Mitigation Performance Sampling Plan will be developed and will include provisions for monitoring the SSDSs immediately after system start-up to document that the sub-slab beneath each mitigated building has been depressurized, as well as to document continuous and long-term reduction of indoor air concentrations of VI contaminants to less than applicable criteria.

4.5 TASK 5 – PERFORM PROFICIENCY SAMPLING AND ANNUAL INSPECTIONS/MAINTENANCE

MONITORING PROGRAM

Valley will complete system startup monitoring to document that the sub-slab beneath the entire area of concern in each building has been depressurized. The system startup monitoring will consist of monitoring and recording the vacuum at each of the vacuum monitoring points in each building using a digital manometer immediately following start-up.

To verify that the mitigation systems are operating to reduce sub-slab concentrations of VI contaminants beneath the slabs of intact buildings to less than applicable ODH screening levels, Valley will complete post-installation proficiency sub-slab air sampling as discussed in Section 3.2.1.4. Valley will collect sub-slab samples from all locations with an installed vapor abatement mitigation system 30-days, 180-days and annually following system installation, provided the SSDS is still required. Valley will also complete radius of influence testing at the same time as the sub-slab sampling. If ODH screening levels are exceeded, Valley will submit a Corrective Action Plan to EPA within 30 days. Proficiency air sampling will continue until EPA notifies Valley that work is complete. Valley will provide the results and corresponding evaluation after each sampling event to EPA within 30 days of receiving the complete set of final analytical data.

To further verify that the mitigation systems are operating to reduce indoor air concentrations of VI contaminants to less than applicable ODH screening levels, Valley will complete post-installation proficiency air sampling as discussed in Section 3.2.1.1. Valley will collect indoor air samples from all locations with an installed vapor abatement mitigation system 30-days, 180-days, and 1 year, following system installation. Valley will also complete radius of influence testing at the same time as the indoor air sampling. If ODH screening levels are exceeded, Valley will submit a Corrective Action Plan to EPA within 30 calendar days of discovery.

Valley will also complete annual indoor air sampling at one building per year, beginning the second year after system installation, provided the SSDS is still required. Proficiency air sampling will continue until EPA notifies Valley that work is complete. Valley will provide the results and corresponding evaluation after each sampling event to EPA within 30 calendar days of receiving the complete set of final analytical data.

MAINTENANCE OF THE SSDS

An OM&M plan will be completed within 60-days of system start-up. The OM&M plan will detail activities required to operate the SSDS, perform repairs, and a guideline to evaluate the effectiveness of system operations. The contents of the OM&M manual will include, but not be limited to:

- Operator's manual for the system
- Contact information sheet
- System life expectancy
- Fan warranty information
- Baseline sample results (30- and 180-days and Annual sampling rounds)
- Proficiency sample results
- Annual inspection log sheets
- Photographic documentation
- Mitigation Acceptance Letter
- Mitigation System As-built Report (including map of system)
- Key to the padlock to turn the system "on" and "off"

The general OM&M plan will include an appendix containing any system-specific information required for each building. The OM&M plan will be placed in a binder to allow for easy updating of any required information and kept on-site.

The SSDS maintenance program will include an inspection and repair program for the system components. Valley will conduct a semi-annual inspection of the SSDS in

the first year of operation, and annually thereafter, to ensure proper functionality. The inspection program will include visual inspections of the SSDSs for deficiencies to verify that the system components are effectively performing their intended functions. The following forms, provided in Appendix H, will be included in the OM&M Plans:

- Building Physical Survey Questionnaire
- SSDS Inspection checklist
- Repair Log

ANNUAL SSDS INSPECTIONS

Valley will complete annual performance inspections on all SSDS installed to ensure that they are functioning properly. System performance inspection activities will include, but are not limited to:

- System vacuum / pressure readings will be checked to ensure the system is operating in the design range
- Sub-slab pressure field readings will be measured at permanent sub-slab sample points to ensure sub-slab depressurization is negative (for buildings with active SSDS and slab foundations)
- Visual inspection of system piping and components for damage
- Inspection of floor and wall seals, and seals around system piping penetrations, including checks for any additional areas requiring sealing
- Confirm operation of the blower fan, including checks for unusual noise or vibration
- Confirm padlock is attached to the on / off switch
- Confirm operation with on-site employees and inspection to determine if there have been any spills, releases, and/or operational changes that may influence the need for system operation

A copy of the Annual SSDS Inspection Form is included in Attachment H.

4.6 VI INVESTIGATION BUILDING MITIGATION SUMMARY

In 2012, others completed vapor intrusion investigations of buildings on Valley Asphalt's Property (1901 and 1903 Dryden Road, Parcel 5054). The seven buildings that were investigated are shown on Figure 1.2. In accordance with the Mitigation Summary Database Excel file, current as of the date of this report, of the seven buildings investigated:

- Four structures* are proposed for demolition, pending a final decision by Valley.
- Three structures* will require a SSDS.
- One building must be assessed for sub-slab contaminants; a removal decision will be made after the assessment results are received.

(* Note that one building, Building 2, consists of two structures: an office space [located in the front of Building 2] and a storage space [located at the back of the building]. The front portion of Building 2 will be demolished; the back portion of Building 2 will be mitigated.)

5.0 SYSTEM DECOMMISSIONING / PROJECT CLOSE-OUT ACTIVITIES

- Criteria to determine when it is appropriate to cease operation of individual vapor SSDSs will be submitted at a future date for US EPA approval.

5.1 ABANDONMENT OF GAS MONITORING PROBES

In the event that a sub-slab soil vapor probe becomes damaged, plugged, or otherwise rendered unusable, or alternatively at the completion of all explosive gas monitoring requirements, the respective gas probe(s) will be abandoned in accordance with industry standards. Such abandonment will consist of over-drilling the sub-slab probe(s) and filling it with cement. No gas monitoring probes will be abandoned without prior authorization from EPA. If a damaged, plugged, or otherwise unusable probe is still

required for monitoring sub-slab soil vapor conditions at a particular location, Valley will replace the probe following the procedures documented in Section 3.4 and Appendix J.

6.0 PROJECT MANAGEMENT

6.1 RESPONSIBILITIES AND FUNCTIONS

The companies, individuals and associated contact numbers for those who will be responsible for the various aspects of the work are detailed in the organizational chart below:

TABLE 5

PROJECT ORGANIZATIONAL CHART

<i>Contact Name</i>	<i>Phone No.</i>
Steven Renninger (U.S. EPA OSC)	513-260-7849
Leslie Patterson (U.S. EPA RPM)	312-886-4904
Laura Marshall (Ohio EPA)	937-285-6452
John Sherrard (Dynamac Corporation EPA START contractor)	513-703-3092
Mark Case (Public Health – Dayton / Montgomery County)	937-225-4429
Bob Frey (ODH)	614-466-1069
Katherine Beach (Project Coordinator, Bowser Morner)	937-236-8805, ext. 340 937-308-1694 (cell)
Jeff Arp (Bowser Morner)	937-236-8805, ext. 258 614-419-0414 (cell)

7.0 **PROJECT SCHEDULE**

<i>Task</i>	<i>Schedule</i>
Weekly Mitigation Status update conference calls with EPA and Respondents	Thursdays at 3:00 pm
Work Plan Due Date	10 days from the AOC Effective Date AOC Effective Date is April 16, 2013 Due Date is April 26, 2013
Revised Work Plan Due Date	May 15, 2013
Written notification to EPA of new contractors and/or subcontractors	At least 5 days prior to commencement of Work
Conduct Asbestos and Lead field surveys	May 15, 2013
Demolish the front (north) portion of Building 2, and Buildings 1, 7 and MP.	July 31, 2013
Initiate Section 4.0 tasks	Within 5 working days of Work Plan approval
Conduct building inspections / engineering evaluations	Anticipated date: week of May 20, 2013
Obtain quotes from licensed radon mitigation companies	Within 1 week of completion of building inspection
Select licensed radon mitigation company	Within 1 week of receipt of quotes
Design sub-slab depressurization system	Within 3 weeks of completion of building inspection / engineering evaluation and Ohio licensed radon subcontractor procurement
Install SS probe in Building 6	Within 4 weeks after EPA approval of work plan
Install SSDS (including additional SS probes, if indicated)	Within 4 weeks of completion of design of sub-slab depressurization system
Implement Mitigation Proficiency Sampling Plan	Within 30-days of installation of sub-slab depressurization system
Monthly Progress Reports	30 days after approval of Work Plan, until termination of UAO
Oral notification of any delay in performance of UAO Obligations	Within 24 hours
Written notification of any delay in performance of UAO obligations	Within 7 days thereafter
O&M Manual submission to EPA	Within 60 days of SSDS start-up
Annual SSDS Inspections	Complete within 30 days of installation date anniversary each year (2014, 2015, etc).
Proficiency indoor air sampling (new SSDS installations)	30, 180, and 365 days post-installation
Proficiency air sampling (sub-set of systems)	Beginning 2 years following SSDS installation

Task	Schedule
Submission of Corrective Action Plan	Within 30 days of receiving sub-slab or indoor air sampling results that are greater than ODH screening levels
SSDS Upgrades	Within 30 days of receiving validated proficiency air sampling analytical results
Indoor air and sub-slab proficiency samples following completion of SSDS Upgrades (if required)	Within 30 days of completion of system modifications
Provision of analytical results and corresponding evaluation to EPA following each sampling event	Within 30 days of receiving the complete set of final analytical results
Final Report summarizing actions completed to comply with UAO	Within 60 days of completion of all work specified in Section V of the UAO (i.e., following completion of proficiency indoor air sampling for new SSDS installations)

Note: All references to *x days after* are calendar days unless otherwise specified.

APPENDIX A

UNILATERAL ADMINISTRATIVE ORDER



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF

MAR 22 2013

S-6J

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Valley Asphalt Corporation
Mr. Martin Lewis
Tucker Ellis & West
1150 Huntington Building
925 Euclid Ave.
Cleveland, Ohio 44115

Attention: Mr. Martin Lewis, Tucker Ellis & West

Re: South Dayton Dump and Landfill Site, Moraine, Ohio
Site Spill Identification Number: B52B
Unilateral Administrative Order

Dear Mr. Lewis:

Enclosed please find a Unilateral Administrative Order issued by the U.S. Environmental Protection Agency under Section 106 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), 42 U.S.C. §§ 9601-9675.

Please note that the order allows an opportunity for a conference if requested within three (3) business days after issuance of the order, or if no conference is requested, an opportunity to submit comments within seven (7) business days of issuance of the order.

If you have any questions regarding the Order, feel free to contact Thomas C. Nash, Associate Regional Counsel, at (312) 836-0552 or Steven Renninger, On-Scene Coordinator, at (513) 260-7849.

Sincerely,

Richard C. Karl, Director
Superfund Division

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Region 5

IN THE MATTER OF:	)	Docket No.	V-W-13-C-008
)		
South Dayton Dump and Landfill	)	ADMINISTRATIVE ORDER	
Moraine, Montgomery County, Ohio	)	PURSUANT TO SECTION 106(a)	
	)	OF THE COMPREHENSIVE	
	)	ENVIRONMENTAL RESPONSE,	
Respondent:	)	COMPENSATION, AND	
	)	LIABILITY ACT OF 1980,	
Valley Asphalt Corporation	)	AS AMENDED, 42 U.S.C.	
	)	§ 9606(a)	

I. JURISDICTION AND GENERAL PROVISIONS

This Order is issued pursuant to the authority vested in the President of the United States by Section 106(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), 42 U.S.C. § 9606(a), and delegated to the Administrator of the United States Environmental Protection Agency (U.S. EPA) by Executive Order No. 12580, January 23, 1987, 52 Federal Register 2923, and further delegated to the Regional Administrators by U.S. EPA Delegation Nos. 14-14-A and 14-14-B, and to the Director, Superfund Division, Region 5, by Regional Delegation Nos. 14-14-A and 14-14-B.

This Order pertains to property located at 1975 Dryden Road in Moraine, Montgomery County, Ohio (the South Dayton Dump and Landfill Site or the Site). This Order requires the Respondent to conduct removal activities described herein to abate an imminent and substantial endangerment to the public health, welfare or the environment that may be presented by the actual or threatened release of hazardous substances at or from the Site.

U.S. EPA has notified the State of Ohio of this action pursuant to Section 106(a) of CERCLA, 42 U.S.C. § 9606(a).

II. PARTIES BOUND

This Order applies to and is binding upon Respondent and Respondent's heirs, receivers, trustees, successors and assigns. Any change in ownership or corporate status of Respondent including, but not limited to, any transfer of assets or real or personal property shall not alter such Respondent's responsibilities under this Order.

Respondent shall ensure that its contractors, subcontractors, and representatives comply with this Order. Respondent shall be responsible for any noncompliance.

III. FINDINGS OF FACT

Based on available information, including the Administrative Record in this matter, U.S. EPA hereby finds that:

1. The Site is located at 1901 through 2153 Dryden Road and 2225 East River Road in Moraine, Ohio. The Site is bounded to the north and west by the Miami Conservancy District floodway (part of which is included in the definition of the Site), the Great Miami River Recreational Trail and the Great Miami River beyond. The Site is bounded to the east by Dryden Road with light industrial facilities beyond, to the southeast by residential and commercial properties along East River Road with a residential trailer park beyond, and to the south by undeveloped land with industrial facilities beyond.
2. The Site is a former industrial landfill located at 1975 Dryden Road in Moraine, Ohio. It encompasses a total of 80 acres, significant portions of which contain landfilled waste. Approximately 40 acres of the landfill have been built over and/or are being used for other commercial/industrial purposes.
3. Approximately 25,060 people live within a 4-mile radius of the Site. Six single-family residences are located on the northwest side of East River Road and are adjacent to the southeast boundary of the Site. A seventh single family home is located on the southeast side of East River Road and is within 300 feet of the Site. A trailer park with several residences is also situated approximately 300 feet southeast of the Site at the southeast intersection of Dryden Road and East River Road.
4. From 1941 to the present, various members of the Boesch and Grillot families have owned a major portion of the property where dumping was conducted. Most of the properties that comprise the Site were acquired over time by Horace Boesch and Cyril Grillot.
5. The landfill operated from the early 1940s to 1996 and includes a partially filled sand and gravel pit. The landfill contains household waste, drums, metal turnings, fly ash, foundry sand, demolition material, wooden pallets, asphalt, paint, paint thinner, oils, brake fluids, asbestos, solvents, transformers and other industrial waste. As the excavated areas of the Site were filled, some of the property was sold and/or leased to businesses including Valley Asphalt and other businesses along Dryden Road and East River Road. The Miami Conservancy District owns the southern part of the site including part of the large quarry pond.
6. Disposal of waste materials began at the Site in the early 1940s. Materials dumped at the Site included drummed wastes. Known hazardous substances were disposed at the Site, including drums containing hazardous waste from nearby facilities. Some of the drums contained cleaning solvents (1,1,1-trichloroethane ["TCA"]; methyl ethyl ketone ["MEK"]; and xylene); cutting oils; paint; stoddard solvents; and machine-tool, water-based coolants. The Site had previously accepted materials including oils, paint residue, brake fluids, chemicals for cleaning metals, solvents, etc. Large quantities of foundry sand and fly ash were dumped at the Site. Asbestos

was also dumped at the Site.

7. U.S. EPA conducted a screening site inspection of the Site in 1991. Ohio EPA conducted a site team evaluation prioritization of the landfill in 1996. In 2002, U.S. EPA conducted an aerial photographic analysis of the site.

8. On May 7, 1993, Valley Asphalt Corporation purchased the property where its facility is located from Cyril J. Grillot and Katherine A. Boesch. This property, formerly platted as Lots 3059 and 3060, is today platted as City Lot 5054. Montgomery County Auditor's records show Valley Asphalt Corporation to be the current owner and the payer of taxes on the property.

9. In 2000, Valley Asphalt removed several drums and 2,217 tons of contaminated soils from their property (northern area of the Site) that were uncovered when a sewer line was being excavated. U.S. EPA proposed the site to the National Priorities List in 2004.

10. In 2006, several potentially responsible parties (PRPs) for the Site agreed to conduct further studies and evaluate cleanup options at the Site under a Remedial Investigation/Feasibility Study (RI/FS). The RI/FS is being conducted under an Administrative Settlement Agreement and Order on Consent with U.S. EPA. In 2008, the PRPs agreed to conduct a streamlined RI/FS at the site. The PRPs conducted several investigations at the site from 2008 through 2010.

11. The 2008-2010 investigations conducted by the PRPs included geophysical surveys, test pit and test trench sampling, vertical aquifer sampling, landfill gas sampling and groundwater monitoring well installation and sampling. From these investigations, it was found that the groundwater contains vinyl chloride, trichloroethylene (TCE), 1,2-dichloroethene, arsenic, lead and other chemicals. Landfill gas contains methane, TCE and other volatile organic compounds. Based on the investigations, the PRPs agreed to divide the site work into two parts. Operable unit one (OU1) would involve evaluating cleanup alternatives to address 55 acres of the landfill, and would include cleanup alternatives that would allow on-site business to remain safely operating at the site.

12. In June 2012, U.S. EPA, in consultation with Ohio EPA, determined that additional data must be collected on groundwater and potential hot spots before selecting a remedy for OU1. U.S. EPA anticipated oversight of additional OU1 RI/FS field work, with a proposed cleanup plan and final OU1 remedy selection by March 2015.

13. Operable unit two (OU2) will involve more detailed investigations of the landfill materials in remaining site areas, surface water and sediment in the on-site Quarry Pond and the Great Miami River, floodplain soils, and off-site groundwater. U.S. EPA expects the PRPs to submit a work plan for the OU2 work in 2013.

14. In a letter dated June 5, 2012, U.S. EPA RPM Karen Cibulskis requested U.S. EPA Emergency Response Branch assistance to determine if the Site met the criteria for a time-critical removal action. The letter requested removal assistance in evaluating U.S. EPA's options for

addressing current and potential vapor intrusion risks at the Site, including whether removal authority could be appropriately used to implement mitigation measures to address all or some of the current and threatened risks posed by VOCs (primarily TCE) in sub-slab soil gas at 12 commercial/industrial buildings built over the landfill, and at an adjacent commercial/industrial building. PRP Vapor intrusion sampling in January and March 2012 has shown TCE sub-slab vapor levels as high as 5,600 parts per billion by volume [ppbv] and TCE indoor air vapor levels as high as 13 ppbv, a documented completed exposure pathway.

15. At the occupied building, located at 2031 Dryden Road, methane was detected in a laboratory sub-slab sample at 0.97%, which exceeds the Ohio Department of Health (ODH) sub-slab methane screening level of 0.5%. Based on field data methane was not detected in the indoor air.

16. In Building 2, located at 1903 Dryden Road, which is used for storage, methane was detected in a laboratory sub-slab sample above 100% of the lower explosive limit (LEL) (the sample concentration was 6.6% methane by volume), but was not detected in indoor air (based on field data). Building 2 is currently closed to access.

17. On July 6, 2012, the ODH provided health-based guidance to evaluate the results of vapor intrusion sub-slab and indoor air sampling for chemicals of concern at the Site. The Agency for Toxic Substances and Disease Registry (ATSDR) and the ODH identified residential and non-residential sub-slab and indoor air screening levels.

18. In a letter dated July 17, 2012, the Ohio EPA expressed concerns about the risk to human health from indoor air exposure to VOCs and the risk of explosive conditions from landfill gas. Ohio EPA views the Site as a threat to the on-Site and surrounding businesses and residences, and supports the Remedial Branch's request for assistance from the Removal Branch in evaluating options for addressing current and potential vapor intrusion risks at the Site.

19. Between July 12 and August 8, 2012, U.S. EPA conducted a Removal Site Investigation at the Site including residential and non-residential sub-slab sampling and the installation of soil gas vapor probes along the Site's eastern perimeter. U.S. EPA sampling has confirmed a completed exposure pathway with respect to vapor intrusion.

20. Vapor intrusion sampling results from 2012 by U.S. EPA and the PRPs have documented vapor intrusion is occurring at the Site. Five non-residential buildings have shown sub-slab TCE concentrations greater than the ODH sub-slab screening level (as high as 17,000 ppbv) and indoor air TCE concentrations greater than the ODH indoor air screening level of 2 ppbv (as high as 50 ppbv). One non-residential building has shown a crawl space PCE concentration at 38 ppbv which exceeds the ODH indoor air PCE screening level of 25 ppbv. In addition, one non-residential building has shown a sub-slab methane level of 6.6%. Methane is explosive between 5% and 15%.

21. U.S. EPA has documented methane levels using field screening and soil gas samples in GP-2

(12-foot and 16-foot depths) ranging from 2.5% to 24.1%. These results are greater than the ODH sub-slab methane screening level of 0.5% and Ohio EPA's perimeter regulatory level of 5% (lower explosive limit). GP-2 is located off-Site, on the eastside of Dryden Road and adjacent to a Dayton Power & Light building. The source of the methane levels in GP-2 has not been determined.

22. U.S. EPA sent an Administrative Order on Consent, to do the Work required on the Valley Asphalt property at the Site, to Valley Asphalt Corporation on December 26, 2012 which was received by Valley Asphalt on January 4, 2013. By a letter received by U.S. EPA on January 22, 2013, Valley Asphalt "declined to execute the Consent Order."

IV. CONCLUSIONS OF LAW AND DETERMINATIONS

Based on the Findings of Fact set forth above, and the Administrative Record supporting these removal actions, U.S. EPA determines that:

1. The South Dayton Dump and Landfill Site is a "facility" as defined by Section 101(9) of CERCLA, 42 U.S.C. § 9601(9).
2. Volatile Organic Compounds (VOCs) including trichloroethylene (TCE) and methane are "hazardous substances" as defined by Section 101(14) of CERCLA, 42 U.S.C. § 9601(14).
3. The Respondent is a "person" as defined by Section 101(21) of CERCLA, 42 U.S.C. § 9601(21).
4. Respondent Valley Asphalt Corporation is the present "owner" and "operator" of Parcel 5054 at the South Dayton Dump and Landfill Site, as defined by Section 101(20) of CERCLA, 42 U.S.C. § 9601(20). Respondent is therefore a liable person under Section 107(a) of CERCLA, 42 U.S.C. § 9607(a).
5. The conditions described in the Findings of Fact above constitute an actual or threatened "release" into the "environment" as defined by Sections 101(8) and (22) of CERCLA, 42 U.S.C. §§ 9601(8) and (22).
6. The conditions present at the Site constitute a threat to public health, welfare, or the environment based upon the factors set forth in Section 300.415(b)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan, as amended (NCP), 40 CFR Part 300. These factors include, but are not limited to, the following:
 - a. Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances, pollutants or contaminants; this factor is present at the Site due to the existence of vapor intrusion which occurs when vapors produced by a chemical spill or

groundwater contamination plume migrate through soil into the foundations of structures and into the indoor air. When chemicals are spilled on the ground, they will seep into the soil and make their way into the groundwater. VOCs, including TCE, produce vapors that travel through soil. These vapors can enter a home or building through cracks in the foundation or into a basement with a dirt floor or concrete slab.

To date, U.S. EPA and the PRPs have conducted vapor intrusion sampling and have documented the following VOC and methane exceedances:

- One non-residential building (2003 Dryden Road – Building 2) showed a sub-slab 1,1-DCA level greater than the ODH sub-slab 1,1-DCA screening level of 160 ppbv, with a high 1,1-DCA concentration of 4,100 ppbv.
- Three non-residential buildings (1903 Dryden Road – Building 2, 2003 Dryden Road – Building 2 and 2031 Dryden Road – Building 1) showed sub-slab benzene levels greater than the ODH sub-slab benzene screening level of 20 ppbv, with a high benzene concentration of 540 ppbv in the sub-slab vapor sample collected from beneath 2031 Dryden Road-Building 1. An indoor air sample collected at 2003 Dryden Road – Building 2 showed a benzene concentration of 2.4 ppbv, which exceeds the ODH indoor air benzene screening level of 2 ppbv. This documents a completed exposure pathway for vapor intrusion.
- Two non-residential buildings (2015 Dryden Road, Building 1 and 2031 Dryden Road, Building 1) showed sub-slab cis-1,2-DCE levels greater than the ODH sub-slab cis-1,2-DCE screening level of 370 ppbv, with a high cis-1,2-DCE concentration of 27,000 ppbv at 2031 Dryden Road, Building 1.
- Three non-residential buildings (1903 Dryden Road, Building 2; 2003 Dryden Road, Building 2; and 2031 Dryden Road, Building 1) showed sub-slab vinyl chloride levels greater than the ODH sub-slab vinyl chloride screening level of 20 ppbv, with a high vinyl chloride concentration of 5,500 ppbv.
- Thirteen non-residential buildings showed sub-slab TCE levels greater than the ODH sub-slab TCE screening level of 20 ppbv, with a high TCE concentration of 17,000 ppbv. Five of the thirteen non-residential buildings show indoor air TCE levels greater than the ODH indoor air TCE screening level of 2 ppbv, with a high TCE concentration of 50 ppbv, documenting a completed exposure pathway. This indoor air TCE result is 2.5 times greater than the removal action screening level provided by ODH. In addition, one non-residential on-Site structure showed a crawl space PCE level greater than the ODH indoor air PCE screening level of 25 ppbv, with a PCE concentration of 38 ppbv.
- One non-residential building (2031 Dryden Road – Building 1) showed a sub-slab m,p-xylene sub-slab concentration of 2,100 ppbv, which exceeds the m,p-xylene screening

level of 2,000 ppbv; and an o-xylene sub-slab concentration of 2,000 ppbv, which equals the o-xylene screening level of 2,000 ppbv.

- 2031 Dryden Road, Building 1 showed a sub-slab methane level of 2.2% and 1903 Dryden Road, Building 2 showed a sub-slab methane level of 6.6%, which exceeds the ODH methane sub-slab screening level of 0.5%. Methane is explosive between 5% and 15%.
- U.S. EPA observed detectable methane concentrations in one soil gas probe, GP-2, using a GEM-2000 methane meter. GP-2 contains nested soil gas sampling depths of 12-foot bgs and at 16-foot bgs. The GP-2 soil gas probe at the 12-foot depth showed methane levels ranging from 14.7% to 17.6%. The GP-2 soil gas probe at the 16-foot depth showed methane levels ranging from 22.2% to 24.1%. The methane levels in GP-2 at depths of 12 and 16 feet bgs exceed Ohio EPA's perimeter regulatory level of 5% (lower explosive limit). GP-2 is located off-Site and on the eastern side of Dryden Road.

There is actual vapor intrusion exposure occurring and there is a potential for additional vapor intrusion to occur at this Site.

TCE is a hazardous substance within the meaning of Section 101(14) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) because it is listed at 40 CFR Section 302.4. Historical sampling, and PRP and U.S. EPA sub-slab and indoor air sampling results indicate that TCE vapors are migrating into non-residential buildings at chronic levels that ODH considers harmful to human health.

TCE is a man-made chemical that is widely used as a cleaner to remove grease from metal parts. TCE is a nonflammable, colorless liquid with a sweet odor. Exposure to TCE at very high concentrations (particularly in closed, poorly ventilated areas) may cause headaches, lung irritation, dizziness, poor coordination (clumsiness), and difficulty speaking. According to the ODH, the evidence that TCE is a human carcinogen has been under review by health organizations since 2001. The U.S. Department of Health and Human Services considers TCE to be "reasonably anticipated to be a human carcinogen" based on limited evidence of carcinogenicity from studies of humans and sufficient evidence of carcinogenicity from studies of laboratory animals. A report recently released by the National Academies of Science National Research Council (2006) has stated that "evidence on cancer and other health risks from TCE exposure has strengthened since 2001", pointing to studies of human populations that support "the conclusion that TCE is a potential cause of kidney cancer." Other ecological studies of communities exposed to TCE in drinking water supplies in Massachusetts, New Jersey, and North Carolina have suggested an association between these exposures and elevated levels of leukemia in the exposed population.

b. Threat of fire or explosion; this factor is present at the Site due to the existence of explosive conditions from landfill gas.

The PRPs conducted vapor intrusion sampling in January and March 2012. Sub-slab sampling showed methane percentages greater than the ODH sub-slab screening level of 0.5% at two non-residential properties.

In July 2012, U.S. EPA documented methane at 2.5% at the 16-foot depth of soil gas probe GP-2 and in August 2012, U.S. EPA documented methane at 2.2% in a sub-slab sample collected from 2031 Dryden Road. These results exceed the ODH sub-slab screening level of 0.5%.

U.S. EPA has documented methane levels in GP-2 (12-foot and 16-foot depths) ranging from 2.5% to 24.1% at off-site locations (City of Moraine property). These results are greater than the ODH sub-slab methane screening level of 0.5% and exceed Ohio EPA's perimeter regulatory level of 5% (lower explosive limit). GP-2 is located off-Site, on the eastside of Dryden Road and adjacent to a DP&L building. Methane is flammable between 5% and 15%. Methane's LEL is 5% and the UEL is 15% methane per volume of air.

At the Site, methane was detected in four laboratory sub-slab soil gas samples above 10% of the LEL (greater than 0.5% methane) at non-residential buildings at the Site. At another building, methane was detected (at 6.6%) in a laboratory sub-slab soil gas sample above 100% of the LEL (greater than 5%). This building has the potential for an explosion/fire hazard if a spark or ignition source is present. This building is now closed to access.

Because methane is extremely flammable in the presence of oxygen and an ignition source (open flame, pilot light), the main public health threat posed from methane is the physical explosion hazard posed by methane levels between 5% and 15% by volume in the air.

Ohio Revised Code (ORC) 3734.041 provides that explosive gases shall be considered to endanger human health or safety or the environment if concentrations of methane generated by the landfill in landfill structures, excluding gas control or recovery system components, exceed 25% of the LEL (or 1.25% methane in the indoor air) or if concentrations of methane generated by the landfill at the landfill boundary exceed the LEL (or 5% methane). U.S. EPA documented methane levels in GP-2 ranging from 14.7% to 24.1%. GP-2 is located about 75-feet east of the eastern boundary of the Site. These methane levels exceed the levels specified at ORC 3734.041.

c. The unavailability of other appropriate federal or state response mechanisms to respond to the release; this factor supports the actions required by this Settlement Agreement at the Site because Ohio EPA does not have the resources to respond to this Site.

In a letter dated July 17, 2012, Ohio EPA expressed concerns about the risk to human health from indoor air exposure to VOCs and the risk of explosive conditions from landfill gas. Ohio EPA views the Site as a threat to the on-site and surrounding businesses and residences, and supports the Remedial Branch's request for assistance from the Removal Branch in evaluating options for addressing current and potential vapor intrusion risks at the South Dayton Dump and Landfill Site.

7. The actual or threatened release of hazardous substances from the Site may present an imminent and substantial endangerment to the public health, welfare, or the environment within the meaning of Section 106(a) of CERCLA, 42 U.S.C. § 9606(a).

8. The removal actions required by this Order are necessary to protect the public health, welfare, or the environment, and are consistent with the NCP and CERCLA.

V. ORDER

Based upon the foregoing Findings of Fact, Conclusions of Law, Determinations, and the Administrative Record for this Site, U.S. EPA hereby orders that Respondent perform the following actions:

1. Notice of Intent to Comply

Respondent shall notify U.S. EPA in writing within 3 business days after the effective date of this Order of Respondent's irrevocable intent to comply with this Order. Failure of Respondent to provide such notification within this time period shall be a violation of this Order. In addition to the U.S. EPA representatives identified in Section V.2 below, a copy of the written notice of intent to comply shall also be sent to: Thomas Nash, Associate Regional Counsel, Office of Regional Counsel, 77 West Jackson Boulevard, C-14J, Chicago, Illinois, 60604-3590 and Superfund Record Center, 77 West Jackson Boulevard, SRC-7J, Chicago, Illinois, 60604-3590. The written notice of intent to comply shall reference the Site name and the docket number of this Order.

2. Designation of Contractor, Project Coordinator, and On-Scene Coordinator

Respondent shall retain a contractor to implement the removal actions. Respondent shall notify U.S. EPA of Respondent's qualifications or the name and qualifications of such contractor(s) within 5 business days of the effective date of this Order. Respondent shall also notify U.S. EPA of the name and qualifications of any other contractors or subcontractors retained to perform work under this Order at least 5 business days prior to commencement of such work. U.S. EPA retains the right to disapprove of any of the contractors and/or subcontractors retained by the Respondent. If U.S. EPA disapproves a selected contractor, Respondent shall retain a different contractor within 2 business days following U.S. EPA's disapproval and shall notify U.S. EPA of that contractor's name and qualifications within 3 business days of U.S. EPA's disapproval.

The contractor(s) retained by the Respondent must demonstrate compliance with American National Standards Institute/American Society for Quality Control (ANSI/ASQC) E-4-2004, "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs" (American National Standard, January 5, 1995), by

submitting a copy of the proposed contractor's Quality Management Plan (QMP). The QMP should be prepared in accordance with "EPA Requirements for Quality Management Plans (QA/R-2)" (EPA/240/B-01/002), or equivalent documentation as required by U.S. EPA. Any decision not to require submission of the contractor's QMP should be documented in a memorandum from the OSC and Regional quality assurance personnel to the Site file.

Within 5 business days after the effective date of this Order, the Respondent shall designate a Project Coordinator who shall be responsible for administration of all the Respondent's actions required by the Order and submit the designated coordinator's name, address, telephone number, and qualifications to U.S. EPA. To the greatest extent possible, the Project Coordinator shall be present on-site or readily available during site work. U.S. EPA retains the right to disapprove of any Project Coordinator named by the Respondent. If U.S. EPA disapproves a selected Project Coordinator, Respondent shall retain a different Project Coordinator within 3 business days following U.S. EPA's disapproval and shall notify U.S. EPA of that person's name and qualifications within 4 business days of U.S. EPA's disapproval. Receipt by Respondent's Project Coordinator of any notice or communication from U.S. EPA relating to this Order shall constitute receipt by Respondent.

The U.S. EPA has designated Steven Renninger of Emergency Response Branch 1, Region 5, as its On-Scene Coordinator (OSC) and Leslie Patterson as its Alternate OSC. Respondent shall direct all submissions required by this Order to OSC Steve Renninger at U.S. EPA/ERT, 26 West Martin Luther King Drive, Cincinnati, Ohio 45268, and to OSC Leslie Patterson at: U.S. EPA, SR-6J, 77 West Jackson Boulevard, Chicago, Illinois 60604, by certified or express mail. Respondent shall also send a copy of all submissions to Thomas Nash, Associate Regional Counsel, 77 West Jackson Boulevard, C-14J, Chicago, Illinois, 60604-3590. All Respondents are encouraged to make their submissions to U.S. EPA on recycled paper (which includes significant post-consumer waste paper content where possible) and using two-sided copies.

3. Work to Be Performed

Respondent shall perform, at a minimum, the following response activities:

- a. Develop and implement a Site Health and Safety Plan for Work to be performed at the Valley Asphalt Property. For purposes of this Administrative Order, "Valley Asphalt Property" shall mean that portion of the Site owned by Valley Asphalt Corporation, consisting of City Lot 5054;
- b. For Valley Asphalt Property, if the ODH Sub-Slab or Indoor Air Screening Level for a contaminant of concern (TCE, PCE, methane, etc) is exceeded for a residential structure, design and install a vapor abatement mitigation system in the structure(s) impacted by subsurface gas migration. The abatement system will include installation of a sub-slab depressurization system (SSDS) or crawl space depressurization system, sealing cracks in walls and floors of the basement, and sealing drains that could be a pathway. The vapor

abatement mitigation system will be designed to control levels of methane and VOCs to below ODH sub-slab and indoor air screening levels;

- c. For Valley Asphalt Property, if the ODH Sub-Slab or Indoor Air Screening Level for a contaminant of concern (TCE, PCE, methane, etc) is exceeded for a commercial structure, design and install a vapor abatement mitigation system in the structure(s) impacted by subsurface gas migration. The abatement system will include installation of a SSDS, sealing cracks in walls and floors, and sealing drains that could be a pathway. The vapor abatement mitigation system will be designed to control levels of methane and VOCs to below ODH sub-slab and indoor air screening levels; and
- d. For Valley Asphalt Property, develop and implement a performance sample plan to confirm that ODH screening levels are achieved for contaminants of concern following installation of on-site vapor abatement mitigation systems.

3.1 Work Plan and Implementation

Within 10 business days after the effective date of this Order, the Respondent shall submit to U.S. EPA for approval a draft Work Plan for performing the removal activities set forth above. The draft Work Plan shall provide a description of, and an expeditious schedule for, the activities required by this Order. The Work Plan shall include a Quality Assurance Project Plan (QAPP). The following documents shall be used for the development of QAPPs for Region 5 Superfund sites:

- The Uniform Federal Policy for Quality Assurance Projects Plans (UFP-QAPP), OSWER Directive 9272.0-17; [the QAPP format can be found at <http://www.epa.gov/fedfac/documents/qualityassurance.htm>];
- EPA Requirements for Quality Assurance Project Plans EPA QA/R-5, March 2001, Reissued May 2006;

The following guidance may be used in conjunction with the requirements above:

- Guidance for the Quality Assurance Project Plans EPA QA/G-5, December 2002.
- Guidance on Choosing a Sampling Design for Environmental Data Collection EPA QA/G-5S, December 2002.

U.S. EPA may approve, disapprove, require revisions to, or modify the draft Work Plan. If U.S. EPA requires revisions, Respondent shall submit a revised draft Work Plan within 7 business days of notification. Respondent shall implement the Work Plan as finally approved in writing by U.S. EPA in accordance with the schedule approved by U.S. EPA. Once approved, or approved with modifications, the Work Plan, the schedule, and any subsequent modifications shall be fully enforceable under this Order. Respondent shall notify U.S. EPA at least 48 hours prior to performing any on-site work pursuant to the U.S. EPA approved Work Plan.

Respondent shall not commence or undertake any removal actions at the Site without prior U.S. EPA approval.

3.2 Health and Safety Plan

Within 10 business days after the effective date of this Order, the Respondent shall submit a plan for U.S. EPA review and comment that ensures the protection of the public health and safety during performance of on-site work under this Order. This plan shall comply with applicable Occupational Safety and Health Administration (OSHA) regulations found at 29 CFR Part 1910. If U.S. EPA determines it is appropriate, the plan shall also include contingency planning. Respondents shall incorporate all changes to the plan recommended by U.S. EPA, and implement the plan during the pendency of the removal action.

3.3 Quality Assurance and Sampling

All sampling and analyses performed pursuant to this Order shall conform to U.S. EPA direction, approval, and guidance regarding sampling, quality assurance/quality control (QA/QC), data validation, and chain of custody procedures. Respondent shall ensure that the laboratory used to perform the analyses participates in a QA/QC program that complies with the appropriate U.S. EPA guidance. Respondent shall follow, as appropriate, "Quality Assurance/Quality Control Guidance for Removal Activities: Sampling QA/QC Plan and Data Validation Procedures" (OSWER Directive No. 9360.4-01, April 1, 1990), as guidance for QA/QC and sampling. Respondent shall only use laboratories that have a documented Quality System that complies with ANSI/ASQC E-4 2004, "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs" (American National Standard, January 5, 1995), and "EPA Requirements for Quality Management Plans (QA/R-2) (EPA/240/B-01/002, March 2001, Reissued May 2006)," or equivalent documentation as determined by U.S. EPA. U.S. EPA may consider laboratories accredited under the National Environmental Laboratory Accreditation Program (NELAP) as meeting the Quality System requirements.

Upon request by U.S. EPA, Respondent shall have such a laboratory analyze samples submitted by U.S. EPA for quality assurance monitoring. Respondent shall provide to U.S. EPA the QA/QC procedures followed by all sampling teams and laboratories performing data collection and/or analysis. Respondent shall also ensure provision of analytical tracking information consistent with OSWER Directive No. 9240.0-2B, "Extending the Tracking of Analytical Services to PRP-Lead Superfund Sites."

Upon request by U.S. EPA, Respondent shall allow U.S. EPA or its authorized representatives to take split and/or duplicate samples of any samples collected by Respondent or its contractors or agents while performing work under this Order. Respondent shall notify U.S. EPA not less than 3 business days in advance of any sample collection activity. U.S. EPA shall have the right to take any additional samples that it deems necessary.

3.4 Reporting

Respondent shall submit a monthly written progress report to U.S. EPA concerning activities undertaken pursuant to this Order, beginning 30 calendar days after the date of U.S. EPA's approval of the Work Plan, until termination of this Order, unless otherwise directed by the OSC. These reports shall describe all significant developments during the preceding period, including the work performed and any problems encountered, analytical data received during the reporting period, and developments anticipated during the next reporting period, including a schedule of work to be performed, anticipated problems, and planned resolutions of past or anticipated problems.

Respondent and any successor in title shall, at least 30 days prior to the conveyance of any interest in real property at the Valley Asphalt Property, give written notice of this Order to the transferee and written notice of the proposed conveyance to U.S. EPA and the State. The notice to U.S. EPA and the State shall include the name and address of the transferee. The party conveying such an interest shall require that the transferee will provide access as described in Section V.4 (Access to Property and Information).

3.5 Final Report

Within 60 calendar days after completion of all removal actions required under this Order, the Respondent shall submit for U.S. EPA review a final report summarizing the actions taken to comply with this Order. The final report shall conform to the requirements set forth in Section 300.165 of the NCP. The final report shall also include a good faith estimate of total costs incurred in complying with the Order, a listing of quantities and types of materials removed, a discussion of removal and disposal options considered for those materials, a listing of the ultimate destinations of those materials, a presentation of the analytical results of all sampling and analyses performed, and accompanying appendices containing all relevant documentation generated during the removal action (e.g., manifests, invoices, bills, contracts, and permits).

The final report shall also include the following certification signed by a person who supervised or directed the preparation of that report:

Under penalty of law, I certify that, to the best of my knowledge, after appropriate inquiries of all relevant persons involved in the preparation of this report, the information submitted is true, accurate, and complete.

4. Access to Property, Cooperation, and Information

Respondent shall provide or obtain access as necessary to the Valley Asphalt Property and all appropriate off-site areas, and shall provide access to all records and documentation related to the conditions at the Valley Asphalt Property and the activities conducted pursuant to this Order.

Such access shall be provided to U.S. EPA, its employees, contractors, agents, consultants, designees, representatives, and State of Ohio representatives. These individuals shall be permitted to move freely at the Valley Asphalt Property and appropriate off-site areas in order to conduct activities which U.S. EPA determines to be necessary. Respondent shall submit to U.S. EPA, upon request, the results of all sampling or tests and all other data generated by Respondent or its contractors, or on the Respondent's behalf during implementation of this Order.

Respondent shall cooperate with and assist U.S. EPA, its employees, contractors, agents, consultants, designees, representatives, and State of Ohio representatives to accomplish and complete the removal actions required under this Order.

Where work under this Order is to be performed in areas owned by or in possession of someone other than Respondent, Respondent shall obtain all necessary access agreements within 14 calendar days after the effective date of this Order, or as otherwise specified in writing by the OSC. Respondent shall immediately notify U.S. EPA if, after using its best efforts, it is unable to obtain such agreements. Respondent shall describe in writing its efforts to obtain access. U.S. EPA may then assist Respondent in gaining access, to the extent necessary to effectuate the response activities described herein, using such means as U.S. EPA deems appropriate.

5. Record Retention, Documentation, Availability of Information

Respondent shall preserve all documents and information, in its possession or the possession of its contractors, subcontractors or representatives, relating to work performed under this Order, or relating to the hazardous substances found on or released from the Site, for six years following completion of the removal actions required by this Order. At the end of this six year period and at least 60 days before any document or information is destroyed, Respondent shall notify U.S. EPA that such documents and information are available to U.S. EPA for inspection, and upon request, shall provide the originals or copies of such documents and information to U.S. EPA. In addition, Respondent shall provide documents and information retained under this Section at any time before expiration of the six year period at the written request of U.S. EPA. Any information that Respondent is required to provide or maintain pursuant to this Order is not subject to the Paperwork Reduction Act of 1995, 44 U.S.C. § 3501 *et seq.*

6. Off-Site Shipments

All hazardous substances, pollutants or contaminants removed off-site pursuant to this Order for treatment, storage or disposal shall be treated, stored, or disposed of at a facility in compliance, as determined by U.S. EPA, with the U.S. EPA Off-Site Rule, 40 CFR § 300.440, 58 Fed. Reg. 49215 (Sept. 22, 1993).

7. Compliance With Other Laws

All actions required pursuant to this Order shall be performed in accordance with all applicable

local, state, and federal laws and regulations except as provided in Section 121(e) of CERCLA and 40 CFR § 300.415(j). In accordance with 40 CFR § 300.415(j), all on-site actions required pursuant to this Order shall, to the extent practicable, as determined by U.S. EPA, considering the exigencies of the situation, attain applicable or relevant and appropriate requirements under federal environmental or state environmental or facility siting laws.

8. Emergency Response and Notification of Releases

If any incident, or change in Site conditions, during the activities conducted pursuant to this Order causes or threatens to cause an additional release of hazardous substances from the Site or an endangerment to the public health, welfare, or the environment, the Respondent shall immediately take all appropriate action to prevent, abate or minimize such release, or endangerment caused or threatened by the release. Respondent shall also immediately notify the OSC or, in the event of his/her unavailability, shall notify the Regional Duty Officer, Emergency Response Branch, Region 5 at (312) 353-2318, of the incident or Site conditions.

Respondent shall submit a written report to U.S. EPA within 7 business days after each release, setting forth the events that occurred and the measures taken or to be taken to mitigate any release or endangerment caused or threatened by the release and to prevent the reoccurrence of such a release. Respondent shall also comply with any other notification requirements, including those in Section 103 of CERCLA, 42 U.S.C. § 9603, and Section 304 of the Emergency Planning and Community Right-To-Know Act, 42 U.S.C. § 11004.

VI. AUTHORITY OF THE U.S. EPA ON-SCENE COORDINATOR

The OSC shall be responsible for overseeing the implementation of this Order. The OSC shall have the authority vested in an OSC by the NCP, including the authority to halt, conduct, or direct any work required by this Order, or to direct any other response action undertaken by U.S. EPA or Respondent at the Site. Absence of the OSC from the Site shall not be cause for stoppage of work unless specifically directed by the OSC.

U.S. EPA and Respondent shall have the right to change their designated OSC or Project Coordinator. U.S. EPA shall notify the Respondent, and Respondent shall notify U.S. EPA, as early as possible before such a change is made, but in no case less than 24 hours before such a change. Notification may initially be made orally, but shall be followed promptly by written notice.

VII. PENALTIES FOR NONCOMPLIANCE

Violation of any provision of this Order may subject Respondent to civil penalties of up to \$37,500 per violation per day, as provided in Section 106(b)(1) of CERCLA, 42 U.S.C.

§ 9606(b)(1) and as adjusted by 69 Fed. Reg. 7121-27 (Feb. 13, 2004) (codified at 40 C.F.R. § 19.4) pursuant to the Debt Collection Improvement Act of 1996. Respondent may also be subject to punitive damages in an amount up to three times the amount of any cost incurred by the United States as a result of such violation, as provided in Section 107(c)(3) of CERCLA, 42 U.S.C. § 9607(c)(3). Should Respondent violate this Order or any portion hereof, U.S. EPA may carry out the required actions unilaterally, pursuant to Section 104 of CERCLA, 42 U.S.C. § 9604, and/or may seek judicial enforcement of this Order pursuant to Section 106 of CERCLA, 42 U.S.C. § 9606.

VIII. REIMBURSEMENT OF COSTS

Respondent shall reimburse U.S. EPA, upon written demand, for all response costs incurred by the United States in overseeing Respondent's implementation of the requirements of this Order. U.S. EPA may submit to Respondent on a periodic basis a bill for all response costs incurred by the United States with respect to this Order. U.S. EPA's Itemized Cost Summary, or such other summary as certified by U.S. EPA, shall serve as the basis for payment.

Respondent shall, within 30 days of receipt of the bill, remit a cashier's or certified check for the amount of those costs made payable to the "Hazardous Substance Superfund," to the following address:

U.S. Environmental Protection Agency
Superfund Payments
Cincinnati Finance Center
Post Office Box 979076
St. Louis, Missouri 63197-9000

Respondent shall simultaneously transmit a copy of the check to the Director, Superfund Division, U.S. EPA Region 5, 77 West Jackson Blvd., Chicago, Illinois, 60604-3590. Payments shall be designated as "Response Costs – South Dayton Dump and Landfill Site" and shall reference the payer's name and address, the U.S. EPA site identification number B52B, and the docket number of this Order.

Interest at a rate established by the Department of the Treasury pursuant to 31 U.S.C. § 3717 and 4 CFR § 102.13 shall begin to accrue on the unpaid balance from the day after the expiration of the 30 day period notwithstanding any dispute or an objection to any portion of the costs.

IX. RESERVATION OF RIGHTS

Nothing herein shall limit the power and authority of U.S. EPA or the United States to take, direct, or order all actions necessary to protect public health, welfare, or the environment or to prevent, abate, or minimize an actual or threatened release of hazardous substances, pollutants or

contaminants, or hazardous or solid waste on, at, or from the Site. Further, nothing herein shall prevent U.S. EPA from seeking legal or equitable relief to enforce the terms of this Order. U.S. EPA also reserves the right to take any other legal or equitable action as it deems appropriate and necessary, or to require the Respondent in the future to perform additional activities pursuant to CERCLA or any other applicable law.

X. OTHER CLAIMS

By issuance of this Order, the United States and U.S. EPA assume no liability for injuries or damages to persons or property resulting from any acts or omissions of Respondent. The United States or U.S. EPA shall not be a party or be held out as a party to any contract entered into by the Respondent or its directors, officers, employees, agents, successors, representatives, assigns, contractors, or consultants in carrying out activities pursuant to this Order. Each party shall bear its own costs and attorneys fees in connection with the action resolved by this Order.

This Order does not constitute a pre-authorization of funds under Section 111(a)(2) of CERCLA, 42 U.S.C. § 9611(a)(2).

Nothing in this Order constitutes a satisfaction of or release from any claim or cause of action against the Respondent(s) or any person not a party to this Order, for any liability such person may have under CERCLA, other statutes, or the common law, including but not limited to any claims of the United States for costs, damages and interest under Sections 106(a) or 107(a) of CERCLA, 42 U.S.C. §§ 9606(a), 9607(a).

XI. MODIFICATIONS

Modifications to any plan or schedule may be made in writing by the OSC or at the OSC's oral direction. If the OSC makes an oral modification, it will be memorialized in writing within 7 business days; however, the effective date of the modification shall be the date of the OSC's oral direction. The rest of the Order, or any other portion of the Order, may only be modified in writing by signature of the Director, Superfund Division, Region 5.

If Respondent seeks permission to deviate from any approved plan or schedule, Respondent's Project Coordinator shall submit a written request to U.S. EPA for approval outlining the proposed modification and its basis.

No informal advice, guidance, suggestion, or comment by U.S. EPA regarding reports, plans, specifications, schedules, or any other writing submitted by the Respondent shall relieve Respondent of its obligations to obtain such formal approval as may be required by this Order, and to comply with all requirements of this Order unless it is formally modified.

XII. NOTICE OF COMPLETION

After submission of the Final Report, Respondent may request that U.S. EPA provide a Notice of Completion of the work required by this Order. If U.S. EPA determines, after U.S. EPA's review of the Final Report, that all work has been fully performed in accordance with this Order, except for certain continuing obligations required by this Order (e.g., record retention), U.S. EPA will provide written notice to the Respondent. If U.S. EPA determines that any removal activities have not been completed in accordance with this Order, U.S. EPA will notify the Respondent, provide a list of the deficiencies, and require that Respondent modify the Work Plan to correct such deficiencies. The Respondent shall implement the modified and approved Work Plan and shall submit a modified Final Report in accordance with the U.S. EPA notice. Failure to implement the approved modified Work Plan shall be a violation of this Order.

XIII. ACCESS TO ADMINISTRATIVE RECORD

The Administrative Record supporting these removal actions is available for review during normal business hours in the U.S. EPA Record Center, Region 5, 77 W. Jackson Blvd., Seventh Floor, Chicago, Illinois. Respondent may contact Thomas C. Nash, Associate Regional Counsel, at (312) 886-0552 to arrange to review the Administrative Record. An index of the Administrative Record is attached to this Order.

XIV. OPPORTUNITY TO CONFER

Within 3 business days after issuance of this Order, Respondent may request a conference with U.S. EPA. Any such conference shall be held within 5 business days from the date of the request, unless extended by agreement of the parties. At any conference held pursuant to the request, Respondent may appear in person or be represented by an attorney or other representative.

If a conference is held, Respondent may present any information, arguments or comments regarding this Order. Regardless of whether a conference is held, Respondent may submit any information, arguments or comments (including justifications for any assertions that the Order should be withdrawn against a Respondent), in writing to U.S. EPA within 2 business days following the conference, or within 7 business days of issuance of the Order if no conference is requested. This conference is not an evidentiary hearing, does not constitute a proceeding to challenge this Order, and does not give Respondent a right to seek review of this Order. Requests for a conference shall be directed to Thomas C. Nash, Assistant Regional Counsel, at (312) 886-0552. Written submittals shall be directed as specified in Section V.2 of this Order.

XV. SEVERABILITY

If a court issues an order that invalidates any provision of this Order or finds that Respondent has sufficient cause not to comply with one or more provisions of this Order, Respondent shall remain bound to comply with all provisions of this Order not invalidated by the court's order.

XVI. EFFECTIVE DATE

This Order shall be effective 10 business days following issuance unless a conference is requested as provided herein. If a conference is requested, this Order shall be effective 5 business days after the day of the conference.

IT IS SO ORDERED

BY:

Richard C. Karl
Richard C. Karl, Director
Superfund Division
United States Environmental Protection Agency
Region 5

DATE:

3-21-13

ATTACHMENT A
INDEX TO THE ADMINISTRATIVE RECORD

U.S. ENVIRONMENTAL PROTECTION AGENCY
REMOVAL ACTION

ADMINISTRATIVE RECORD
FOR
SOUTH DAYTON DUMP AND LANDFILL SITE
MORaine, MONTGOMERY COUNTY, OHIO

ORIGINAL
MARCH 13, 2013
SEMS ID:

<u>NO.</u>	<u>SEMS ID</u>	<u>DATE</u>	<u>AUTHOR</u>	<u>RECIPIENT</u>	<u>TITLE/DESCRIPTION</u>	<u>PAGES</u>
1	255879	03/30/03	Techlaw Inc	U.S. EPA	Techlaw Inc - Draft Title Search Addendum - Reference #6	42
2	262758	08/15/06	Karl, R., U.S. EPA	Respondents	Administrative Settlement Agreement & Order On Consent For Ri/Fs (Signed) - V-W-06-C-852	106
3	437166	06/09/11	CRA	U.S. EPA	Cra - Fig 3: 2009 & 2010 Soil Vapor Sampling Results That Exceed EPA Screening Levels (VOCS)	1
4	437167	06/09/11	CRA	U.S. EPA	Cra - Fig 3: 2009 & 2010 Soil Vapor Sampling Results That Exceed EPA Screening Levels (Methane)	1
5	437168	11/04/11	Cibulskis, K., U.S. EPA	K., Conestoga - Rovers & Associates	EPA - Modified Vapor Intrusion Study Work Plan W/Cover Letter	125
6	437169	06/01/12	U.S. EPA	Public	EPA - Site Summary/Fact Sheet	3
7	437170	06/01/12	Ohio Dept. of Health	Public	Fact Sheet: Methane: Answers To FAQs	2
8	437171	06/05/12	Cibulskis, K., U.S. EPA	Renninger, S., U.S. EPA	EPA Memo Re: Request For Removal Assistance In Evaluating Vapor Intrusion Data & Removal Authority	2

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10	437173	07/06/12	Frey, R., Ohio Dept. of Health	Renninger, S., U.S. EPA	OH Dept Of Health Letter Re: Transmittal Of Screening Levels For Contaminants Of Concern In Indoor & Sub-Slab Soil Gas	4
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2.	437166	06/09/11	CRA	U.S. EPA	CRA—Fig 3: 2009 & 2010 Soil Vapor Sampling Results that Exceed EPA Screening Levels (VOCs)	1
3.	437167	06/09/11	CRA	U.S. EPA	CRA—Fig 3: 2009 & 2010 Soil Vapor Sampling Results that Exceed EPA Screening Levels (Methane)	1
4.	902162	10/29/12	Sherrard, J. Weston	Renninger, S. U.S. EPA	Site Assessment Report For the South Dayton Landfill Site	121

APPENDIX B

METHANE MONITORING FORM

Methane Monitoring Log

Property Address: 1903 Dryden Road, Moraine, Ohio

Owner's Name: Valley Asphalt

Building Designation: ☒ 2

Probe #2 (in Quonset Hut)

Date	Permanent Gas Monitor Status	Gas Pressure	CH ₄ % by volume (v/v)	Water level in probe	Ambient Barometric Pressure	Ambient Temp (°F)	Relative Humidity	Current Weather Conditions
	<input type="checkbox"/> Green <input type="checkbox"/> Red							
	<input type="checkbox"/> Green <input type="checkbox"/> Red							
	<input type="checkbox"/> Green <input type="checkbox"/> Red							
	<input type="checkbox"/> Green <input type="checkbox"/> Red							
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	<input type="checkbox"/> Green <input type="checkbox"/> Red							
	<input type="checkbox"/> Green <input type="checkbox"/> Red							
	<input type="checkbox"/> Green <input type="checkbox"/> Red							

Comments (include date):

APPENDIX C

HEALTH AND SAFETY PLAN

21.0 DECONTAMINATION

Decontamination procedures should be strictly adhered to prevent possible cross-contamination from affected areas on-site to other areas of the site, as well as from areas on-site to off-site areas. For the same reason, vehicles will be restricted from entering the Temporary Exclusion Zone unless authorized by the Site Engineer.

Any worker involved in decontamination procedures is to wear disposable suits, gloves, and boots as well as a respirator.

Equipment

Upon mobilization to the site, following boring, excavation, and backfilling activities at the site and before demobilization from the site, all equipment is to be decontaminated at the decontamination facility on the site. Continuous 10-mil polyethylene sheeting is to be secured over the decontamination facility to control dust and water particulates.

Equipment decontamination is to consist of degreasing (as required) followed by high-pressure, low-volume, hot water cleaning, or hand washing along with non-phosphate detergents (for example, Alconox) as appropriate. The steam-cleaning process should be capable of heating and maintaining wash waters to a minimum of 180 degrees Fahrenheit with a nozzle pressure of 150 pounds per square inch (psi).

Bore stem equipment used in the boring operations is to be decontaminated in wash tubs on the decontamination pad to collect wash water and sediment.

Using a sump pump, decontamination waters from the decontamination facility are to be transferred to specific drums. Soil sediments removed from equipment during decontamination are to be periodically collected and placed in specified drums. All drums are to be stored in locations on-site as approved by the site engineer. After equipment has been decontaminated in preparation to demobilize from the site, the site engineer must inspect and approve decontamination as being complete.

I have read the above and I understand all the items presented.

Date: _____

Signature _____

Mark Twain said it best: *"It's better to be careful a hundred times than to get killed once."*

Site Health and Safety Plan (HASP)
for Valley Asphalt
1901 and 1903 Dryden Road
Moraine, Ohio

For

Valley Asphalt
11641 Mosteller Road
Cincinnati, Ohio 45241

April 25, 2013

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HEALTH AND SAFETY PLAN (HASP)

This Health and Safety Plan (HASP) contains standard operating procedures that will be used for environmental site activities at the Valley Asphalt Facility, Dayton, Ohio. These procedures are designed to:

- 1) Protect the safety of all personnel working at the site.
- 2) Keep off-site personnel safe with regard to activities occurring on-site.
- 3) Reduce the potential for environmental degradation caused by the on-site activities.

1.0 INTRODUCTION

Safety is our first and highest priority. This HASP document is intended to provide the standard operating and safety procedures and guidelines to be used during environmental investigations and remediation projects. These procedures are designed to establish a framework in which operations at the work site will proceed. This Safety Plan was prepared based on an anticipated scope of work defined in the environmental investigation and remedial action specifications for the site.

Since it is, of course, impossible to anticipate and plan for all the safety requirements and contingencies that may arise during the performance of site work, this plan will be changed and modified in response to new situations that occur as the work progresses. This safety plan is intended to address the central foreseeable safety issues and procedures and to outline the ways of implementing necessary changes/additions to the plan in the field. This safety plan describes the procedures for:

- Safe work practices
- Preventing accidents
- Engineered safeguards
- Protecting personnel from injury and illness
- Medical surveillance
- Identifying specific hazards
- Environmental and personnel monitoring
- Personal protective equipment
- Education and training
- Standard operating safety procedures

2.0 SAFETY ORGANIZATION

Although everyone involved in the project shares the responsibility for safety, the Site Health and Safety Officer (SHSO) is primarily responsible for implementing the safety plan. The safety officer's responsibilities, if an SHSO is required on this project, are described below.

2.1 SITE HEALTH AND SAFETY OFFICER (SHSO)

The Site Health and Safety Officer is responsible for administering the safety program at the site. The duties of this officer, who reports to the Project Coordinator, include monitoring the site work to verify that it is conducted safely and making sure that safety regulations are adhered to by construction personnel and others on the work site. The Site Health and Safety Officer has full authority to stop any dangerous site activities. Other duties of the Site Health and Safety Officer are discussed below.

3.0 PERSONNEL TRAINING REQUIREMENTS

As noted earlier, no special zones are expected for this project. However, if during the field work, special "Exclusion" and "Contamination Reduction" zones as required in the OSHA regulations that govern hazardous waste operations and emergency responses will be designated, all personnel required to enter the "Exclusion" and "Contamination Reduction" zones will have completed documented training in accordance with the requirements stated in 29 CFR 1910.120.

3.1 OFF-SITE TRAINING

All contractor and subcontractor personnel assigned to or regularly entering the Exclusion Zones or Contamination Reduction Zones on the site will have received appropriate health and safety training in accordance with 29 CFR 1910.120. This requirement does not apply to the Support Zone where work is supervised or performed for health, safety, security, or administrative purposes, for maintenance, or for any other site-related function. Those who will enter the Exclusion or Contamination Reduction Zones will attend at least 40 hours of initial safety training off-site. All personnel will take at least eight hours of refresher safety training each year.

3.2 SITE-SPECIFIC TRAINING

As required, personnel assigned to the site will complete a training session of sufficient duration to demonstrate that they are capable of and familiar with the use and care of safety, respiratory, and protective equipment and with site control, decontamination, emergency, safety, and security procedures required for this site. If required, the site-specific training session will be conducted by the site health and safety officer. That site-specific training program would address elements of the HASP and hazards associated with that specific site and tasks. Only personnel who have successfully completed the site-specific training would then be allowed to enter the site to work.

3.3 PERIODIC TRAINING

If required, weekly follow-up training sessions, including discussions of operational problems and compliance with the site-specific health and safety plan, will be conducted by the Site Health and Safety Officer for personnel assigned to work at the site. Before any change that affects the on-site field work is implemented, a meeting to explain health and safety procedures will be held. Daily safety briefings will also be conducted as needed to update personnel on specific health and safety requirements.

4.0 MEDICAL SURVEILLANCE

4.1 MEDICAL MONITORING

Personnel entering an "Exclusion Zone" or "Contamination Reduction Zone" must meet the medical monitoring requirements of 29 CFR 1910.120. OSHA's 29 CFR 1910.120 regulation requires that employers implement a medical monitoring program consistent with paragraph (f) of the standard. This standard states that employees are to be medically examined before they are hired, at least once a year thereafter, and after injuries or overexposures.

4.2 POST-EXPOSURE/INJURY MONITORING

Any employee injured or suspected of being injured as a result of an uncontrolled release of hazardous substance or energy, or another emergency situation will be medically evaluated as soon as possible. The attending doctor will be given a copy of the OSHA Hazardous Waste Site regulations and its appendices (29 CFR 1910.120). The doctor will also be given:

- A description of the employee's duties as they relate to the person's physical and chemical exposures.
- A description of personal protective equipment used.
- A description of the employee's exposure levels.
- Information from previous medical examinations of the person.

5.0 SITE-SPECIFIC HEALTH AND SAFETY PLAN

The site-specific health and safety plan, which addresses concerns on this project, is outlined in the next section.

SITE HEALTH & SAFETY PLAN (HASP)

5.1 WORK LOCATION & DESCRIPTION

Project Number 161803

1. Name: Valley Asphalt
2. Location: 1901 – 1903 Dryden Road
Moraine, Ohio

- Prepared by: Henry M. Butcher
Date: April 25, 2013
Reviewed by: Katherine H. Beach, R.E.M.
Date: April 26, 2013
Approved by: _____
Date: _____
3. Type: Hazardous Waste Site (X) Industrial () Construction ()
Other () Describe _____
4. Anticipated Activities: Soil Vapor Intrusion Mitigation
5. Size: Total = 10-acres; Work Areas < 1-acre
6. Surrounding Population: Site sits atop South Dayton Dump & Landfill (SDDL);
surrounding population is commercial and light industry, with residential areas about ¼-
mile away .
7. Buildings/Homes/Industry: Industrial Slab-on-grade or crawlspace.
8. Topography: Relatively flat, with storage piles

9. Weather Anticipated: Varied
10. Site History: The SDDL operated from the early 1940s to 1996 and is partially filled sand and gravel pit. The SDDL contains household waste, drums, metal turnings, fly ash, foundry sand, demolition material, wooden pallets, asphalt, paint, paint thinner, oils, brake fluids, asbestos, solvents, transformers and other industrial materials known to have been brought to the SDDL site. As the excavated areas of the SDDL site were filled, some of the property was sold and/or leased to businesses along Dryden and East

May 7, 1993.

5.2 HAZARD DESCRIPTIONS

- Unknown () C () D (X)

Justification This description is based on the chemical hazards known to be present.

- ## 2. Types of Hazards:

- Toxic ()

- B. Biological: ()

[illegible]

- Heat Stress (X) Other ()

Describe: Heat stress or cold stress could be a factor, depending on weather.

SSDS).

- D. Radiation (type, etc.)

- ### 3. Nature of Hazards:

Air (X) Describe: _____

Soil (X) Describe: : _____

Surface Water () Describe: N/A _____

Ground Water () Describe: _____

Other () Describe: _____

4. Chemical Contaminants of Concern:

<u>Contaminant</u>	<u>PEL, TLV, STEL</u>	<u>IDLH (PPM)</u>	<u>Characteristic s</u>	<u>Route of Exposure</u>	<u>Symptoms of Exposure</u>	<u>Monitoring Instrument</u>
Trichloroethylene	PEL = 100 PPM	1000 PPM	Colorless liquid with a chloroform like odor	Inhalation, ingestion, skin and eye contact	Irritation to the eyes, nose, throat, cough, pulmonary secretions, chest pain Potential Human Carcinogen	Air Sampling
Methane	PEL = 1000 PPM TLV = 1000 PPM	4500 PPM	Colorless gas	Inhalation, ingestion, skin and eye contact	Simple Asphyxiant, respiratory conditions may be aggravated by over exposure	Air sampling
Benzene	PEL = 1 PPM TLV = 0.1 PPM	500 PPM	Colorless to light-yellow liquid with an aromatic odor	Inhalation, ingestion, skin and eye contact	Irritation to eyes, skin, nose, headache, nausea Potential Human Carcinogen	Air sampling
Vinyl Chloride	PEL =1 PPM	Not Determined	Colorless gas or liquid with a pleasant odor at high concentrations	Inhalation, skin and eye contact	Weak, abdomen pain, GI Bleeding Potential Human Carcinogen	Air Sampling

5. Physical Hazards (X)

Hazard	Activity	Location	Control Measures
Abrasions	Manual labor	Buildings 2, 4 and 5	Work gloves
Lacerations	Cutting and/or power tools	Buildings 2, 4 and 5	Kevlar gloves
Flying Objects	All	Buildings 2, 4 and 5	Safety glasses
Falling Objects	All	Buildings 2, 4 and 5	Hard Hat and Steel Toe footwear
Fire/Explosion	Cutting and/or power tools	Buildings 2, 4 and 5	Hot Work Permit, Including Administrative Controls

6. Air Monitoring Readings (X)

Readings of Gas Meter must be taken at 15-minute increments throughout work in Buildings 2, 4 and 5. Gas Meter must operate continuously throughout work performed in Buildings 2, 4 and 5. Record readings below:

Building: Date/Time:	Building: Date/Time:	Building: Date/Time:
% O ₂	% O ₂	% O ₂
% LEL	% LEL	% LEL
VOCs (ppb or ppb)	VOCs (ppb or ppb)	VOCs (ppb or ppb)
Other:	Other:	Other:

Building:	Building:	Building:
Date/Time:	Date/Time:	Date/Time:
% O ₂	% O ₂	% O ₂
% LEL	% LEL	% LEL
VOCs (ppb or ppb)	VOCs (ppb or ppb)	VOCs (ppb or ppb)
Other:	Other:	Other:

Building:	Building:	Building:
Date/Time:	Date/Time:	Date/Time:
% O ₂	% O ₂	% O ₂
% LEL	% LEL	% LEL
VOCs (ppb or ppb)	VOCs (ppb or ppb)	VOCs (ppb or ppb)
Other:	Other:	Other:

Building:	Building:	Building:
Date/Time:	Date/Time:	Date/Time:
% O ₂	% O ₂	% O ₂
% LEL	% LEL	% LEL
VOCs (ppb or ppb)	VOCs (ppb or ppb)	VOCs (ppb or ppb)
Other:	Other:	Other:

5.3 PERSONAL PROTECTIVE EQUIPMENT

1. Level of Protection

A () B () C () D (X)

Location/Activity: Soil Vapor Extraction Installation

A () B () C () D ()

Location/Activity _____

2. Protective Equipment

Respiratory (X) N/A

() SCBA, Airline

() Full Face Respirator

() Escape Mask

() None

() Other _____

Clothing () N/A

() Fully Encapsulating Suit

() Chemically Resistant
Splash Suit

() Apron, Specify _____

() Tyvek Coverall

() Saranex Coverall

() Coverall, Specify _____

(X) Other: Standard work clothes

() Other: Nomax Coveralls

Head & Eye (X)

(X) Hard Hat

() Goggles

() Face Shield

() Chemical Eyeglasses

() None

(X) Other Safety Glasses.

Hand Protection (X)

() Undergloves Nitrile

(X) Gloves Work Gloves

Type

() Overgloves _____

Type

() None

(X) Other Kevlar

Hearing Protection

(X) When using power tools

Foot Protection () N/A

(X) Safety Boots

() Disposable Overboots

() Other _____

3. Monitoring Equipment (X)

() CGI

() PID

() O₂ Meter

() FID

() Rad. Survey

(X) Other Methane Monitor

(X) Type- TBD; must include O₂ LEL, VOC, others as indicated

5.4 PERSONNEL DECONTAMINATION

(Attach Diagram if required)

Required ()

Not Required (X)

Equipment Decontamination (Attach Diagram if required)

Required () Not Required (X)

If required, describe and list equipment: See Section 21.0, "Decontamination."

5.5. SITE PERSONNEL

Name

1. Tim Boehmer

2. Ken Boehmer

3. Ron Price

5.6 ACTIVITIES COVERED UNDER THIS PLAN

<u>Task No.</u>	<u>Description</u>	<u>Preliminary Schedule</u>
1	Soil Vapor Extraction Installation	As notified by client.

5.7 EVALUATION OF SUBCONTRACTOR'S HEALTH AND SAFETY PROGRAM

Name and Address of Subcontractor: _____

Activities to be Performed by Subcontractor: _____

EVALUATION CRITERIA

<u>Item</u>	<u>Adequate</u>	<u>Inadequate</u>	<u>Comments</u>
Medical Surveillance Program	()	()	_____
Personal Protective Equipment	()	()	_____
On-Site Monitoring Equipment	()	()	_____
Safe Working Procedures	()	()	_____
Training Protocols	()	()	_____
Emergency Procedures	()	()	_____
Evacuation Procedures Contingency Plan	()	()	_____
Decontamination Procedures Equipment	()	()	_____
Decontamination Procedures Personnel	()	()	_____
Incident/Injury Rate	()	()	_____

EVALUATION CONDUCTED BY: _____

DATE: _____

5.8 CONTINGENCY CONTACTS

<u>Agency</u>	<u>Contact</u>	<u>Phone Number</u>
Fire Department		911
Police Department		911
Emergency Medical Service/ Ambulance		911

5.9 CONTINGENCY PLANS

If during work activities on-site a release or accident occurs, the following emergency communication steps should be taken immediately:

- 1) Emergency communications are to be made verbally (face-to-face, radio or phone), by vehicle horns, by hand/arm signals, or by hand-held sirens;
- 2) One long blast of a siren or one arm continuously waving over a worker's head means to stop work and return to a pre-determined muster location;
- 3) Repeated short blasts of a siren or both arms continuously waving over a worker's head will mean that an emergency condition exists on-site and employees are to leave the site immediately and gather at the site gate.

In a life-threatening situation, decontamination procedures will be ignored.

In the event of a fire, follow instructions on the Hot Work Permit. Fire extinguishers will be made readily available within the work area to fight fires.

5.10 EMERGENCY PHONE NUMBERS

EMERGENCY PHONE NUMBERS

AMBULANCE	911
FIRE DEPARTMENT	911
POLICE	911

5.11 SITE CONTROL

Site workers will not be physically exposed to the solid/hazardous waste that lies below the surface of the Site. It is expected, however, that workers will be exposed to low levels of volatile organic compounds (VOCs) and methane once they enter Buildings 2, 4 and 5. As required in Sections B.5 and C.2 of this HASP, administrative controls must be employed to eliminate these hazards before additional work may proceed. In addition, once the concrete slabs associated with Buildings 2, 4 and 5 are penetrated in preparation of installation of the sub-slab depressurization systems (SSDSs), workers may encounter additional exposure to low levels of volatile organic compounds (VOCs) and methane rising from beneath the sub-slab. As required in Sections B.5 and C.2 of this HASP, administrative controls must continue to eliminate these hazards before additional work may proceed.

5.12 SITE HEALTH AND SAFETY PLAN

I have read, understood, and agreed with the information set forth in this Health and Safety Plan (and attachments) and discussed in the Personnel Health and Safety briefing.

_____	_____	_____
Name	Signature	Date
_____	_____	_____
Name	Signature	Date
_____	_____	_____
Name	Signature	Date
_____	_____	_____
Name	Signature	Date
_____	_____	_____
Name	Signature	Date

6.0 AIR MONITORING AND SITE ENTRY CRITERIA

<u>Level</u>	<u>Action</u>
RADIATION	
Background - 1 mrem/hr	Continue
mrem/hr - 10 mrem/hr	Proceed with CAUTION at direction of radiation physicist
10 + mrem/hr	Exit
OXYGEN	
19.5% - 25.0%	Continue
Less than 19.5%	SCBA required, combustible gas meters not reliable.
Greater than 25.0%	Exit
COMBUSTIBLE GAS	
Less than 10% of LEL	Continue
10% - 25% of LEL	Proceed with CAUTION
Greater than 25% of LEL	Exit
ORGANIC VAPOR (VOC)	
Background	Level D
> Background - 5 PPM	Level "C" with constant monitoring with OVA and/or photo-ionizer.
5 - 500 PPM	Level "B" with routine monitoring
500 - 1000 PPM	Level "A" with routine monitoring

THESE CRITERIA ARE GUIDELINES WHICH TO BASE ENTRY DECISIONS. THEY ARE NOT GUARANTEES OF SAFETY AND ARE INTENDED ONLY FOR USE BY FULLY TRAINED AND QUALIFIED PERSONNEL.

7.0 LEVELS OF PROTECTION

I. INTRODUCTION

Personnel must wear protective equipment when work activities involve known or suspected atmospheric contamination, when vapors, gases, or particulate may be generated, or when direct contact with skin-affecting substances may occur. Respirators can protect lungs, gastrointestinal tract, and eyes against air toxicants. Chemical-resistant clothing can protect the skin from contact with skin-destructive and absorbable chemicals. Good personal hygiene limits or prevents ingestion of material.

Equipment to protect the body against contact with known or anticipated chemical hazards has been divided into four categories according to the degree of protection afforded:

- Level A: Should be worn when the highest level of respiratory, skin, and eye protection is needed.
- Level B: Should be selected when the highest level of respiratory protection is needed, but a lesser level of skin protection. Level B protection is the minimum level recommended on initial site entries until the hazards have been further defined by on-site studies and appropriate personnel protection utilized.
- Level C: Should be selected when the type(s) of airborne substance(s) is known, the concentration(s) is measured, and the criteria for using air-purifying respirators are met.
- Level D: Should not be worn on any site with respiratory or skin hazards. Is primarily a work uniform providing minimal protection.

The Level of Protection selected should be based primarily on:

- Type(s) and measured concentration(s) of the chemical substance(s) in the ambient atmosphere and its toxicity.
- Potential of measured exposure to substances in air, splashes of liquids, or other direct contact with material due to work being performed.

In situations where the type(s) of chemical(s), concentration(s), and possibilities of contact are not known, the appropriate Level of Protection must be selected based on professional experience and judgment until the hazards can be better characterized.

While personal protective equipment reduces the potential for contact with harmful substances, ensuring the health and safety of response personnel requires, in addition, safe work

practices, decontamination, site entry protocols, and other safety considerations. Together these protocols establish a combined approach for reducing potential harm to workers.

II. LEVELS OF PROTECTION - EQUIPMENT DESCRIPTION

A. Level A Protection

1. Personal Protective Equipment

- Pressure-demand, self-contained breathing apparatus, approved by the Mine Safety and Health Administration (MSHA) and National Institute of Occupational Safety and Health (NIOSH).
- Fully encapsulating chemical-resistant suit
- Coveralls*
- Long cotton underwear*
- Gloves (outer), chemical-resistant
- Gloves (inner), chemical-resistant
- Boots, chemical-resistant, steel toe and shank. (Depending on suit construction, worn over or under suit boot)
- Hard hat* (under suit)
- Disposable protective suit, gloves, and boots* (Worn over fully encapsulating suit)
- 2-way radio communications (intrinsically safe)

2. Criteria For Selection

Meeting any of these criteria warrants use of Level A Protection:

- The chemical substance(s) has been identified and requires the highest level of protection for skin, eyes, and the respiratory system based on:
 - measured (or potential for) high concentration(s) of atmospheric vapors, gases, or particulate
 - or -
 - site operations and work functions involving high potential for splash immersion, or exposure to unexpected vapors, gases, or particulate

- Extremely hazardous substances (for example: dioxin, cyanide compounds, concentrated pesticides, Department of Transportation Poison "A" materials, suspected carcinogens, and infectious substances) are known or suspected to be present, and skin contact is possible.
- The potential exists for contact with substances that destroy skin.
- Operations must be conducted in confined, poorly ventilated areas until the absence of hazards requiring Level A protection is demonstrated.
- Total atmospheric readings on the Century OVA System, HUN, and similar instruments indicate 500 to 1,000 ppm of unidentified substances.

3. Guidance on Selection Criteria

The fully encapsulating suit provides the highest degree of protection to skin, eyes, and respiratory system if the suit material is resistant to the chemical(s) of concern during the time the suit is worn and/or at the measured or anticipated concentrations. While Level A provides maximum protection, the suit material may be rapidly permeated and penetrated by certain chemicals from extremely high air concentrations, splashes, or immersion of boots or gloves in concentrated liquids or sludge. These limitations should be recognized when specifying the type of chemical-resistant garment. Whenever possible, the suit material should be matched with the substance it is used to protect against.

The use of Level A protection and other chemical-resistant clothing requires evaluating the problems of physical stress, in particular, heat stress associated with the wearing of impermeable protective clothing. Response personnel must be carefully monitored for physical tolerance and recovery.

Protective equipment, being heavy and cumbersome, decreases dexterity, agility, visual acuity, etc., and so increases the probability of accidents. This probability decreases as less protective equipment is required. Thus, increased probability of accidents should be considered when selecting a level of protection.

B. Level B Protection

1. Personal Protective Equipment

- Pressure-demand, self-contained breathing apparatus (MSHA/NIOSH approved)
- Chemical-resistant clothing (overalls and long-sleeved jacket; coveralls; hooded, one- or two-piece chemical-splash suit; disposable chemical-resistant coveralls)
- Coveralls*
- Gloves (outer), chemical-resistant

- Gloves (inner), chemical-resistant
- Boots (outer), chemical-resistant, steel toe and shank
- Boots (outer), chemical-resistant (disposable)*
- Hard hat (face shield)*
- Two-way radio communications (intrinsically safe)

*Optional

2. Criteria For Selection

Meeting any one of these criteria warrants use of Level B protection:

- The type(s) and atmospheric concentration(s) of toxic substances have been identified and require the highest level of respiratory protection, but a lower level of skin and eye protection. These would be atmospheres:
 - with concentrations Immediately Dangerous to Life and Health (IDLH)
 - or -
 - exceeding limits of protection afforded by a full-face, air-purifying mask
 - containing substances for which air-purifying canisters do not exist or have low removal efficiency
 - or -
 - containing substances requiring air-supplied equipment, but substances and/or concentrations do not represent a serious skin hazard.
- The atmosphere contains less than 19.5% oxygen.
- Site operations make it highly unlikely that the small, unprotected area of the head or neck will be contacted by splashes of extremely hazardous substances.
- Total atmospheric concentrations of unidentified vapors or gases range from 5 ppm to 500 ppm on instruments such as the Century OVA System or HNU photo-ionizer, and vapors are not suspected of containing high levels of chemicals toxic to skin.

3. Guidance on Selection Criteria

Level B equipment provides a high level of protection to the respiratory tract but a somewhat lower level of protection to skin. The chemical-resistant clothing required in Level B is available in a wide variety of styles, materials, construction detail, permeability, etc. These factors all affect the degree of protection afforded. Therefore, a specialist should select the most

effective chemical-resistant clothing (and fully encapsulating suit) based on the known or anticipated hazards and/or job function.

Generally, if a self-contained breathing apparatus is required, Level B clothing rather than a Level A fully encapsulating suit is selected, based on the protection needed against known or anticipated substances affecting the skin. Level B skin protection is selected by:

- Comparing the concentrations of known or identified substances in air with skin toxicity data.
- Determining the presence of substances that are destructive to and/or readily absorbed through the skin by liquid splashes, unexpected high levels of gases or particulates, or other means of direct contact.
- Assessing the effect of the substance (at its measured air concentrations or splash potential) on the small area of the head and neck unprotected by chemical-resistant clothing.

For initial site entry and reconnaissance at an open site, approaching whenever possible from the upwind direction, Level B protection (with good quality, hooded, chemical-resistant clothing) should protect response personnel, providing the conditions described in selecting Level A are known or judged to be absent. For continuous operations, the aforementioned criteria must be evaluated.

At 500 ppm total vapors/gases, upgrading to Level A protection may be advisable. A major factor for re-evaluation is the presence of vapors, gases, or particulates requiring a higher degree of skin protection.

C. Level C Protection

1. Personal Protective Equipment

- Full-face, air-purifying, canister-equipped respirator (MSHA/NIOSH)
- Chemical-resistant clothing (overalls and long-sleeved jacket; coveralls; hooded, one- or two-piece chemical-splash suit; disposable chemical-resistant coveralls)
- Coveralls*
- Gloves (outer), chemical-resistant
- Gloves (inner), chemical-resistant
- Boots (outer), chemical-resistant, steel toe and shank
- Boots (outer), chemical-resistant (disposable)*
- Hard hat (face shield)*

- Escape mask*
- Two-way radio communications (intrinsically safe)

*Optional

2. Criteria For Selection

Meeting any one of these criteria permits use of Level C protection:

- Measured air concentrations of identified substances will be reduced by the respirator to at or below the substance's exposure limit, and the concentration is within the service limit of the canister.
- Atmospheric contaminant concentrations do not exceed IDLH levels.
- Atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect the small area of skin left unprotected by chemical-resistant clothing.
- Job functions have been determined not to require self-contained breathing apparatus.
- Total vapor readings register between background and 5 ppm above background on instruments such as the HNU Photo-ionizer and Century OVA System.

3. Guidance on Selection Criteria

Level C protection is distinguished from Level B by the equipment used to protect the respiratory system, assuming the same type of chemical-resistant clothing is used. The main selection criterion for Level C is that conditions permit wearing air-purifying devices.

The air-purifying device must be full-face mask (MSHA/NIOSH approved) equipped with a canister suspended from the chin or on a harness. Canisters must be able to remove the substances encountered. Quarter- or half-masks or cheek-cartridge full-face masks should be used only with the approval of a qualified individual.

In addition, a full-face, air-purifying mask can be used only if:

- The oxygen content of the atmosphere is at least 19.5% by volume.
- The substance(s) is identified and its concentration(s) is measured.
 - The individual passes a qualitative fit-test for the mask.
 - An appropriate cartridge/canister is used, and its service limit concentration is not exceeded.

An air-monitoring program is part of all response operations when atmospheric contamination is known or suspected. It is particularly important that the air be monitored

thoroughly when personnel are wearing air-purifying respirators (Level C). Surveillance using direct-reading instruments and air sampling as needed should be conducted continuously to detect any changes in air quality necessitating a higher level or respiratory protection. See Part B for guidance on air monitoring.

Total unidentified vapor/gas concentrations of 5 ppm above background require Level B protection. Only a qualified individual should select Level C (air purifying respirators) protection for continual use in an unidentified vapor/gas concentration of background to 5 ppm above background.

D. Level D Protection

1. Personal Protective Equipment

- Coveralls*
- Gloves*
- Boots/shoes, leather or chemical-resistant, steel toe and shank
- Boots (outer), chemical-resistant (disposable)*
- Safety glasses or chemical splash goggles*
- Hard hat (face shield)*
- Escape mask*

*Optional

2. Criteria For Selection

Meeting any of these criteria allows use of Level D protection:

No hazardous air pollutants have been measured. Work functions preclude splashes, immersion, or potential for unexpected inhalation of any chemicals.

3. Guidance on Selection Criteria

Level D protection is primarily a work uniform. It can be worn in areas where: 1) only boots can be contaminated, or 2) there are no inhalable toxic substances.

III. PROTECTION IN UNKNOWN ENVIRONMENTS

In all site operations, selecting the appropriate personal protection equipment is one of the first steps in reducing the potential for adverse health effects. Until the hazardous conditions presented by an environmental incident can be identified and personal safety measures commensurate with the hazards -- real or potential -- can be instituted, preliminary measures will

have to be based on applying experience, judgment, and professional knowledge to the particular incident at hand. Lack of knowledge concerning the hazards that could be encountered precludes selecting protective equipment by comparing environmental concentrations of known toxicants against protection afforded by each type of equipment.

One of the first considerations in evaluating the risk of an unknown environment is to measure immediate atmospheric hazards such as the concentrations (or potential concentrations) of vapors, gases, and particulate; oxygen content of the air; explosive potential; and, to a lesser degree, the possibility of radiation exposure. In addition to air measurements, visual observation and/or evaluation of existing data can help determine the degree of risk from other materials that are explosive, have high fire potential, are extremely toxic, or exhibit other hazardous characteristics that cannot be monitored by field instruments.

Total vapor/gas concentration as indicated by instruments such as the Century OVA System or the HNU photo-ionizer is a useful adjunct to professional judgment in selecting the Level of Protection to be worn in an unknown environment. It should not be the sole criterion, but should be considered with all other available information. Total vapor/gas concentration should be applied only by qualified persons.

The initial on-site survey and reconnaissance, which may consist of more than one entry, is to characterize the immediate hazards and, based on these findings, establish preliminary safety requirements. As data are obtained from the initial survey, the Level of Protection and other safety procedures are adjusted. Initial data also provide information on which to base further monitoring and sampling. No method can select a level of protection in all unknown environments. Each situation must be examined individually. Some general approaches can be given, however, for judging the situation and determining the level of protection required.

A. Level C.

Level C protection (full-face, air-purifying respirator) should be worn routinely in an atmosphere only after the type(s) of air contaminant(s) is identified and concentrations are measured. To permit flexibility in prescribing a level of protection at certain environmental incidents, a specialist could consider air-purifying respirators for use in unidentified vapor/gas concentrations of a few parts per million. The guideline of total vapor/gas concentration of background to 5 ppm above background should not be the sole criterion for selecting Level C. Since the individual contributors may never be completely identified, a decision on continuous wearing of Level C must be made after assessing all safety considerations including:

- The presence of (or potential for) organic or inorganic vapors/gases against which a canister is ineffective or has a short service life.
- The known (or suspected) presence in air of substances with low TLV or IDLH levels.
- The presence of particulate in air.

- The presence of (or potential for) substances in air which do not elicit a response on the instrument(s) used.
- The potential for higher concentrations in the ambient atmosphere or in the air adjacent to specific site operations.

The continuous use of air-purifying respirators (Level C) should be based on the identification of the substances contributing to the total vapor/gas concentration and the application of published criteria for the routine use of air-purifying devices. Unidentified ambient concentrations of organic/vapors or gasses in air approaching or exceeding 5 ppm above background require Level B protection.

Individuals without appropriate training and/or experience should be discouraged from modifying upward the recommended total vapor/gas concentration guideline and associated levels of protection.

B. Level A

Level A should be worn when maximum protection is needed against substances that could damage the surface of the skin and/or be absorbed through the skin. Since Level A requires the use of a self-contained breathing apparatus, the eyes and respiratory system are also protected. For initial site entry, skin toxicants would exist primarily as vapors, gases, or particulate in air, with a lesser possibility of splash. Continuous operations at an abandoned waste site, for instance, may require Level A due to working with and around severe skin toxicants.

Until air monitoring data are available to assist in the selection of the appropriate Level of Protection, the use of Level A for initial site entries may have to be based on indirect evidence of the potential for atmospheric contamination or direct skin contact.

Considerations that may require Level A protection include:

- Confined spaces: Enclosed, confined, or poorly ventilated areas are conducive to buildup in air of toxic vapors, gases, or particulates. (Explosive or oxygen-efficient atmospheres also are more probable in confined spaces). Low-lying outdoor areas like ravines, ditches, and gullies tend to accumulate any heavier-than-air vapors or gases.
- Suspected/known toxic substances: Various substances may be known or suspected to be involved in an incident, but there are no field instruments available to detect or quantify air concentrations. In these cases, media samples must be analyzed in the laboratory. Until these substances are identified and the levels are measured, maximum protection may be necessary.
- Visible emissions: Visible emissions from leaking containers or railroad/vehicular tank car as well as smoke from chemical fires indicate high potential for concentrations of substances that could be extreme respiratory or skin hazards.

- Job functions: Initial site entries are generally walk-throughs in which instruments and/or visual observations provide a preliminary characterization of the hazards. Subsequent entries are to conduct the many activities needed to reduce the environmental impact of those hazards. Levels of protection for later operations are based not only on data obtained from the initial and subsequent environmental monitoring, but also on the probability of contamination. Maximum protection (Level A) should be worn when:
 - there is a high probability for exposure to high concentrations of vapors, gases, or particulate
 - substances could splash, or
 - substances are known or suspected of being extremely toxic directly to the skin or by being absorbed.

Examples of situations where Level A has been worn are:

- Excavating of soil suspected of being contaminated with dioxin.

8.0 HAND SIGNALS

<u>Hand Signal</u>	<u>Means:</u>
Hands on top of head.	I need assistance
Gripping partner's wrist or placing both hands around partner's arm.	Leave area immediately
Thumbs up.	OK; I'm all right.
Thumbs down.	No; negative.
Hand gripping throat.	Cannot breathe; out of air.
Pointed finger on extended arm.	Look in that direction.
Waving hands over head from side to side.	Attention; stand-by for the next signal.
Swinging hand up from direction of person receiving signal and continuing in circular motion.	Come here.

9.0 TEMPERATURE STRESS

A. Effects of Heat Stress

If the body's physiological processes fail to maintain a normal body temperature because of excessive heat, a number of physical reactions can occur ranging from mild (such as fatigue, irritability, anxiety, and decreased concentration, dexterity, or movement) to fatal. Standard reference books should be consulted for specific treatment.

Heat-related problems include:

- Heat Rash: Caused by continuous exposure to heat and humid air and aggravated by chafing clothes. Decreases ability to tolerate heat as well as being a nuisance.
- Heat Cramps: Caused by profuse perspiration with inadequate fluid intake and chemical replacement (especially salts). *Signs: muscle spasm and pain in the extremities and abdomen.*
- Heat Exhaustion: Caused by increased stress on various organs to meet increased demands to cool the body. *Signs: shallow breathing; pale, cool, moist skin; profuse sweating; dizziness and lassitude.*
- Heat Stroke: The most severe form of heat stress. The body must be cooled immediately to prevent severe injury and/or death. *Signs and symptoms are: red, hot, dry skin; no perspiration; nausea; dizziness and confusion; strong, rapid pulse; coma.*

B. Heat Stress Monitoring

For monitoring the body's recuperative ability to excess heat, one or more of the following techniques should be used as a screening mechanism. Monitoring of personnel wearing impervious clothing should begin when the ambient temperature is 70°F or above. Frequency of monitoring should increase as the ambient temperature increases or as slow recovery rates are indicated. When temperatures exceed 85° F workers should be monitored for heat stress after every work period.

- Heart rate (HR) should be measured by the radial pulse for 30 seconds as early as possible in the resting period. The HR at the beginning of the rest period should not exceed 110 beats per minute. If the HR is higher, the next work period should be shortened by 10 minutes (33%), while the length of the rest period stays the same. If the pulse rate is 100 beats per minute at the beginning of the next rest period, the following work cycle should be shortened by 33%.
- Body temperature should be measured orally with a clinical thermometer as early as possible in the resting period. Oral temperature (OT) at the beginning of the rest period should not exceed 99°F. If it does, the next work period should be shortened by 10 minutes (or 33%), while the length of the rest period stays the same. However, if the OT exceeds 99.7°F at the beginning of the next period, the following work cycle should be further shortened by 33%. Oral temperature should be measured against the end of the rest period to make sure that it has dropped below 99°F.

- Body water loss (BWL) due to sweating should be measured by weighing the worker in the morning and in the evening. The clothing worn should be similar at both weighings; preferably the worker should be nude. The scale should be accurate to $\pm 1/4$ lb. Body water loss should not exceed 1.5% of the total body weight. If it does, the worker should be instructed to increase his daily intake of fluids by the weight lost. Ideally, body fluids should be maintained at a constant level during the work day. This requires replacement of salt lost in sweat as well.

10.0 COLD STRESS

A. Effect of Cold Exposure

Persons working outdoors in temperatures at or below freezing may be frostbitten. Extreme cold for a short time may cause severe injury to the surface of the body, or result in profound generalized cooling, causing death. Areas of the body with high surface-area-to-volume ratios such as fingers, toes, and ears are the most susceptible.

Two factors, ambient temperature and the velocity of the wind, influence the development of a cold injury. Wind chill is used to describe the chilling effect of moving air in combination with low temperature. For instance, 10° with a wind of 15 miles per hour (mph) is equivalent in chilling effect to still air at -18°F.

As a general rule, the greatest incremental increase in wind chill occurs when a wind of 5 mph increases to 10 mph. In addition, since water conducts heat 240 times faster than air, the body cools suddenly when chemical-protective equipment is removed if the clothing underneath is soaked with perspiration.

Local injury resulting from cold is included in the generic term "frostbite." There are several degrees of damage. Frostbite of the extremities can be categorized into:

- Frost nip or incipient frostbite: Characterized by suddenly blanching or whitening skin.
- Superficial frostbite: Skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient.
- Deep frostbite: Tissues are cold, pale, and solid; extremely serious injury. Systemic hypothermia is caused by exposure to freezing or rapidly dropping temperature. *Its symptoms are usually exhibited in five stages: 1) shivering, 2) apathy, listlessness, sleepiness, and (sometimes) rapid cooling of the body to less than 95°F, 3) unconsciousness, glassy stare, slow pulse, and slow respiratory rate, 4) freezing of the extremities, and finally, 5) death.*

B. Prevention of Cold Stress

Cold stress is prevented by wearing adequate clothing in layers, by taking breaks, and through the use of a buddy system evaluation.

11.0 MOTOR VEHICLE OPERATIONS

Operate company vehicles only if you are authorized to do so, and have a valid operator's license or commercial driver's license (CDL) in your possession. Do not permit unauthorized persons to operate or ride in company vehicles. Obey all traffic laws and company safety rules applicable to the operation of the vehicle you are operating.

Use defensive driving techniques at all times. Make allowances for lack of skills and knowledge of others. Drive to prevent accidents in spite of incorrect actions of others and adverse conditions. Drive professionally. Protect yourself and the company by being courteous, safe, dependable, and defensive. Use knowledge, alertness, foresight, good judgment, and skill.

Safety-inspect your vehicle at regular intervals and make any repairs required. Keep your vehicle in good condition at all times.

Keep your vehicle clean and orderly. Debris, cans, bottles, and loose tools are not permitted in the driver's compartments. Make sure the vehicle is equipped with required emergency and warning devices in good condition.

Ensure good visibility by cleaning glass and lights, adjusting mirrors, and keeping wipers in good condition. Use safety belts as provided and required by law. Do not operate a motor vehicle when your physical or mental condition may constitute a hazard.

Do not permit riders on any part of the vehicle except seats with seat belts.

Use extreme caution when backing. Use the horn. Use another person as a guide. Keep constant lookout and always check blind areas. Back slowly; watch all sides. Do not depend entirely on mirrors. Park vehicle legally to reduce chances of an accident.

Do not park closer than 10 feet to traveled road surface unless proper warnings are used.

Secure your load to prevent shifting, sifting, dislodging, or creating a hazard. Do not exceed legal speed limits. Shift to lower gears when descending a steep hill.

Drive professionally and conserve fuel.

12.0 OFFICE AND BUILDING SAFETY

Wipe up spills, eliminate tripping and slipping hazards, pick up loose objects off floor, and keep aisles and steps uncluttered. Good housekeeping is essential.

Keep walkway, storage, and work areas clear and orderly.

Report unsafe conditions immediately.

Know the locations and use of exits, fire extinguishers, fire alarms, first aid kits, and emergency phone numbers. Know emergency exit and action procedures.

Keep file and desk drawers closed. Open only one drawer at a time to prevent tripping.

Handle sharp objects carefully.

Do not place broken glass, sharp objects, or ash tray contents into waste baskets.

Wear shoes with moderate heels. Flimsy footwear, dangling jewelry, and long draping clothes can be a risk.

Use step ladders, not chairs, for reaching high places.

Use proper lifting methods and carry loads you can see over. Do not read and walk. Approach intersections, corners, and doorways carefully. Do not run.

Avoid tipping chairs over. Be careful of chairs with rollers.

Make certain all electrical equipment is grounded, cords are in safe condition, and the equipment is located so as not to create a tripping or fire hazard. Do not overload circuits.

Be careful in using hazardous liquids. Read labels and follow warnings. Keep such substances in safety containers stored safely.

Be careful with mechanical and cutting equipment. Unplug or lock-out power equipment before adjusting.

Secure equipment properly.

Obey NO SMOKING rules.

13.0 EXCAVATIONS AND SHORING

In all cases, trench excavations are to follow 29 CFR 1926.650, or the latest modification, Occupational Safety and Health Standards, Excavations; final rule.

Any trench or trenching that does not follow these guidelines should not be entered by Bowser-Morner personnel.

In general, any trench deeper than five feet and less than 20 feet deep shall be benched and sloped back or braced in accordance with the soil type as specified in 29 CFR 1926.

If any other method is used, the design computation for such a device must be available for review.

Any trench or excavation deeper than 20 feet must have a professional engineer's design data sheet available for review.

14.0 CONFINED SPACES

Definition:

Confined Space -- A space in which, because of its construction, location, contents, or work activity, a hazardous gas, vapor, dust, or fumes or the creation of an oxygen-deficient or -enriched atmosphere may occur.

Examples:

Confined spaces are enclosed structures with limited access such as a manhole, tanks, pits, vats, vaults, bins, silos, pipelines, sewers, tunnels, and wells.

How to Recognize a Confined Space:

Construction

- Is the space totally enclosed?
- What is the number, location and size of openings?

Location

- Is the space above or below floor level?
- Can airborne contaminants accumulate in the space?

Contents

- What is the nature of materials in the space?
- Do they give off toxic gases, fumes, vapors and dusts?
- Is oxygen-enrichment or -deficiency possible?

Work Activity

- What is the nature of the work to be carried out?
- Will the activity affect oxygen supply?
- Will the process generate heat, toxic gases, dust, etc.?

Potential Hazards

Confined space accidents often result in serious injury or death. These accidents occur as a result of:

- Inability to identify conditions in the space.
 - Lack of training in identifying hazards and control measures.
 - Failure to implement protective measures.
- a. Toxic Gases, Vapors, Fumes, and Dusts. These can cause serious injury or death and include toxins, asphyxiates and irritants such as all gases and vapors known to produce disease; asphyxiates (methane carbon monoxide; irritants); hydrogen sulfide; and sulfur dioxide.
 - b. Combustible Gases, Vapors, and Dusts. May ignite in the presence of a source of ignition. Depends on concentration in air -- within the upper and lower explosive limits (UEL, LEL).
 - c. Oxygen Deficiency. Atmospheres containing less than 18% oxygen -- normal air contains about 21%. The condition may result from purging with inert gases, oxidation, etc.
 - d. Oxygen Enrichment. Atmospheres containing more than 23% oxygen.
 - e. Entry of Material from Supply Lines. Liquids and gases
 - f. Electric Shock. Energized equipment
 - g. Mechanical. Dangerous moving parts of machinery.
 - h. Extremes of Temperature and Humidity. Equipment such as boilers, freezers, and ovens.
 - i. Shifting or Collapse of Bulk Material. Loose material such as grains.

Precautions for Entry

Selection, Education and Training

Selection -- In selecting persons to enter or work in confined spaces, attention should be paid to the following:

- Physical condition.
- Psychological Suitability -- the person should not be adversely affected by closed, cramped spaces or suffer from dizziness.

Training

Training should include:

- Information on actual and potential hazards of the space.

- Instruction on procedures and precautions for entry.
- Pre-entry procedures such as lock out, blanking, atmospheric testing.

Ventilation

- The space should be pressure ventilated when toxic/combustible atmosphere is present.
- Ventilation should continue throughout the work period.
- Ventilation should also be done to control temperature.

Fire and Explosion

- Sources of ignition should be removed.
- Electrical equipment should be flame- and explosion-proof.
- Except for breathing apparatuses, oxygen and other gas cylinders should not be taken into the space.
- Welding and cutting torches should not be left in the space.
- Firefighting equipment should be readily available.

Access/Egress

- Openings should be large enough (24-inch-diameter minimum) to permit the entry of workers wearing safety equipment.
- Covers, doors, etc., should be easily opened.
- Ladders should be secured.

Blanking Off

- The work area should be isolated to prevent ingress of hazardous substances. Valves may be chained and padlocked. Physical disconnection by blanks or blinds is preferred.

Locking Out

- Agitators, pumps, conveyors, etc., should be locked out.

Electric Shock

- Electrical tools and equipment should be grounded. Welding electrodes should be well insulated. Particular attention should be paid to conductive liquids.

Personal Protective Equipment

- Proper PPE to be provided - hard hats, goggles, gloves, coveralls, and respiratory equipment.

Work Area Evaluation

- The work area should be evaluated by a competent person before being entered.
- Each work evaluation is to be done separately for each job, and appropriate records should be kept.
- Permits to work should be issued. It is impossible to design a permit to fit all situations.

Specific workplace conditions should be considered in designing each permit.

Rescue Plan and Equipment

Attention should be paid to:

- The sizes and locations of openings.
- Rescue gear -- safety belts, harnesses, and life lines.
- Safety watches.
- First aid and CPR.
- Your location to inform 911 personnel.

15.0 WELDING OR TORCH WORK

No task(s) that produces heat, sparks, or energy sufficient to serve as an ignition source may begin in any location which could potentially have ignitable atmospheres, until a Hot Work Protection Procedure has been instituted.

Examples of hot work include welding, cutting, burning, soldering, grinding, the use of power tools, and the use of internal combustion engines.

The Site Health and Safety Officer is responsible for obtaining any required hot work permits.

Permits must be reissued at the beginning of each day, each work shift or if the area has not been monitored within one-half hour.

Hot Work Permit Procedures

1. The SHSO is responsible for inspecting each site and determining the specific needs and procedures.
2. A fire watch is required for every activity where hot work could result in other than a minor fire due to ignition of combustibles.
3. Fire extinguishing equipment commensurate with the ignitable matrix and training level of the fire watch must be immediately available at the Hot Work location.
4. A combustible gas meter must be used to survey the Hot Work location and then must be left to constantly monitor the air between the flammable material and the immediate vicinity of the hot work.
5. Welding or cutting on close systems must be specifically approved by the SHSO or the CIH.

16.0 HEAVY EQUIPMENT OPERATION

Preventative maintenance procedures recommended by the manufacturer are to be followed. Any machinery or equipment found to be unsafe will be deadlined and its use prohibited until unsafe conditions have been corrected.

Inspections or determinations of road conditions and structures are to be made in advance to assure that clearances and load capacities are safe for the passing or placing of any machinery or equipment.

Machinery and mechanized equipment is to be operated only by designated personnel. Equipment deficiencies observed at any time that affect their safe operation must be corrected before continuing operation. Seats or equal protection must be provided for each person required to ride on equipment.

Getting off or on any equipment while it is in motion is *prohibited*. Machinery or equipment requiring an operator must not be permitted to run unattended. Machinery or equipment is not to be operated in a manner that will endanger persons or property nor are the safe operating speeds or loads to be exceeded.

All machinery or equipment will be shut down and positive means taken to prevent its operation while repairs or manual lubrications are being done. Exemption: Equipment designated to be serviced while running.

All repairs on machinery or equipment will be made at a location that will provide protection from traffic for repair persons.

Heavy machinery, equipment, or parts thereof that are suspended or held apart by slings, hoists, or jacks also will be substantially blocked or cribbed before personnel are permitted to work under or between them.

Bulldozers, Scraper Blades, End-Loader Buckets and Dump Bodies

Bulldozers, scraper blades, end-loader buckets, dump bodies, and similar equipment must be either fully lowered or blocked when being repaired or when not in use. All controls are to be in the neutral position, with the engines stopped and brakes set, unless work being performed on the machine requires otherwise.

Stationary machinery and equipment is to be placed on a firm foundation and secured before being operated.

All points requiring lubricating during operation are to have fittings so located or guarded to be accessible without hazardous exposure.

When necessary, all mobile equipment and the operating area will be adequately illuminated while work is in progress.

Mechanized equipment is to be shut down before and during fueling operations. Closed systems with automatic shut-offs to prevent spillage if connections are broken may be used to fuel diesel-powered equipment left running.

All towing devices used on any combinations of equipment must be structurally adequate for the weight drawn and securely mounted. Persons *are not permitted* to get between a towed and a towing piece of equipment until the towing equipment has been stopped.

All equipment with a windshield must be equipped with powered wipers. Vehicles that operate in conditions that cause fogging or frosting of windshields must be equipped with operable defogging and defrosting devices.

All equipment left unattended at night, next to a highway in normal use, or next to construction areas where work is in progress must have lights or reflectors, or barricades equipped with lights or reflectors, to identify the location of the equipment.

Whenever the equipment is parked, the parking brake is to be set. Equipment parked on inclines is to have wheels chocked or the track mechanism blocked and the parking brake set.

The controls of loaders, excavators, or similar equipment with folding booms or lift arms are not to be operated from a ground position unless so designed. Personnel are not to work or pass under the buckets or booms of loaders in operation.

17.0 HAND AND POWER TOOL SAFETY

Unsafe hand tools are not to be issued or used. All hand tools are to be kept in good repair and used only for the purpose for which they were designed. Wrenches with sprung jaws where slippage could occur, impact tools with mushroomed heads, and wooden-handled tools with cracks or splinters are examples of unsafe hand tools.

Tools having defects that will impair their strength or render them unsafe will be tagged or made inoperable and removed from service.

Guards must be in place during operation on all power tools designed to accommodate them. Guards and safety devices must remain in place on power tools unless removed according to the manufacturer's instruction for maintenance by a competent person; the guards must be replaced before the equipment is used. Belts, gears, shafts, drums, fly wheels, chains or other rotating, reciprocating or moving parts exposed to employee contact or representing other hazard must be guarded.

Proper personal protective equipment must be used when operating power tools or hand tools that may produce projectiles, cuts, abrasions, dusts, fumes, mists, or light, or which pose a risk of harm to arms, legs, or feet if dropped.

When work is being performed overhead, tools not in use are to be secured or placed in holders.

Throwing tools or materials from one location to another, from one person to another, or dropping them to lower levels, is not permitted.

Only non-sparking tools are to be used in locations where sources of ignition may cause a fire or explosion.

Power tools are to be inspected, tested, and determined to be safe for operation prior to use. Continued periodic inspections are to be made to assure safe operating condition and proper maintenance.

Electric-powered tools must be approved double insulated or grounded in accordance with 29 CFR 1926.404.

Rotating or reciprocating portable power tools must have a constant pressure switch that will shut off the power when the tool is released by the operator. A portable power tool may have a lock-on control if it can be turned off by a single motion of the same finger or fingers that turned it on.

All hydraulic or pneumatic tools which are used on or around energized lines or equipment will have non conducting hoses having adequate strength for the normal operating pressures.

Loose and frayed clothing, loose long hair, dangling jewelry, rings, chains, and wrist watches will not be worn while working with any power tool or machine.

18.0 ILLUMINATION

Construction site offices, stairways, passageways, construction roads, and working areas are to be lighted while work is in progress by at least the following minimum light intensities:

<u>Facility Name or Function</u>	<u>Lighting Intensity</u> (Foot Candles)
Accessways - General Indoor	5
Accessways - General Outdoor	3
Administrative Areas (Offices, Drafting Rooms, Conference Rooms, etc.)	50
Barracks, BOQ's Mess Halls, Base Exchanges	30
Construction Areas	5
Indoor - General	5
Outdoor - General	3
Concrete Placement Operation	3
Excavation and Fill Areas	3
Docks and Loading Platforms	3
Exitways, Walkways, Ladders, and Stairways	10
Maintenance, Operating and Construction Shops and Areas	
Aircraft Maintenance	50
Auto Maintenance Shops	30
Carpenter Shops	10
Field Maintenance Area Outside	5
Refueling - Outside	5
Shops - Medium Work	30
Mechanical and Electrical Equipment Rooms	10
Medical and First-Aid Stations	30
Toilets and Wash Rooms	10
Tunnels and General Underground Work Areas	5
Warehouses and Storage Rooms and Areas	
Active or Bulk Storage -- Inside	10
Inactive Storage -- Inside	5
Stockrooms	10
Outside Storage -- Active	3
Work Areas -- General	30

Where artificial light is required, it is to be maintained until personnel have had an opportunity to leave the area.

19.0 LADDERS

- Use approved, correct-size ladders designed for the job.
- Never use metal ladders near energized lines or equipment.

- Check the ladder's condition and use it only if it's safe; tag, report, and take defective ladders out of service.
- Place the ladder base not less than one-fourth of its working length from the supporting surface (a 4 to 1 ratio) and not more than one-third of the working length from the supporting surface unless it's securely held or tied in place.
- Inspect ladders regularly, maintain in good condition, and store properly. Do not paint ladders.
- Fasten ladders securely when transporting. Use proper lifting and safety precautions when carrying them.
- Never use a box or chair in place of a ladder.
- Place ladder on a firm, substantially level base -- not on a movable object. Place the ladder so that side rails have a secure footing on solid ground to prevent sinking.
- Never place a ladder against insecure support.
- Make sure straight ladders have non-skid feet or are securely tied off.
- Fasten ladders placed against aerial cable strands and secure the user properly.
- Make sure the top of the ladder extends three feet above the landing and is secured.
- Do not leave a placed ladder unattended. Remove ladders at the end of the work day.
- Ascend or descend ladders one step at a time, facing the ladder and using both hands.
- Make sure your footwear is not greasy, muddy, or slippery. Use extreme caution during wet or icy weather.
- Do not climb a ladder while wearing climbers.
- Do not climb higher than the third rung from the top on straight ladders or the third step from the top on stepladders.
- Do not shift the position or "walk" a ladder while on it.
- Keep both feet on the ladder and do not overreach.
- Do not walk or stand under a ladder holding a worker.
- Fully extend the stepladder spreader and set the locking device before climbing the ladder.
- Do not use a stepladder as a straight ladder.
- Do not place a ladder near an unsecured door.

20.0 BORING SAFETY

Pre-Subsurface Exploration Work

Although predicting every contingency that may occur during subsurface exploration is difficult, the items listed below are very important. Following them will help reduce the chance of an injury occurring on the job site. The crew chief should always, always:

- Complete the vehicle inspection checklist before each trip.
- Review maps showing underground and overhead utilities if they're available.
- Call local utility companies and the Ohio Utilities Protection Service (OUPS) to ask them to physically mark the locations of any underground utility lines. Remember that the utility companies need 2 working days notice.
- Visually inspect the area where the subsurface exploration will take place for signs of utilities such as gas lines, manholes, water lines, electric lines, etc.
- Review any available site map with a client representative to determine where the utilities are.
- If necessary, surveying may need to be done to locate underground utilities.
- Obtain proper permits from the client representatives before you start work. these permits include hot work, lockout/tagout, utility clearance, etc.
- Check the area for overhead power lines. If the lines are within 10 to 20 feet of the planned work area, the decision of whether the power lines need to be de-energized or insulated before subsurface exploration begins must be made by the client and/or the crew chief.
- If you are working around process lines inside or outside of a plant, extreme caution needs to be taken during the subsurface exploration. If you smell any unusual odors, hit a process line, or notice any other signs that may indicate that the lines are leaking, the area should be evacuated and the proper plant personnel should be notified. Air sampling or another sampling method may be required before safe access to that area can be obtained.

Mobilization

For your safety, you should follow the steps listed below when you mobilize to a job site.

- First, you should inspect the boring rig using the subsurface exploration equipment checklist, a copy of which is attached.
- Before you mobilize to the actual exploration site, you should walk the route of travel looking for creeks and streams, depressions, gullies, ruts, debris, plant hazards such as overhanging branches, and other possible hazards. You should also be sure that the ground is solid enough for heavy equipment to travel safely on it.
- You must also make sure that plant personnel, pedestrians, or any other bystanders are clear of equipment when the rig is moving.
- When the equipment has been moved to the boring location, you should set the brakes. You should also make sure that the rig is level before the subsurface exploration begins.
- Always use extreme caution when you travel up or down steep grades. Whenever possible, travel directly downhill or uphill. If you travel at an angle down or up a hill, the center of gravity of the rig or truck may shift as the tools move, perhaps causing an accident.
- When you travel up a steep grade, you should anchor the winch line from the boring rig to a suitable unmovable object at the top of the grade if at all possible.
- You should cross relatively small obstacles like logs, ditches, and channels squarely, not at an angle.
- When overhead or lateral clearance is restricted, you should use a "spotter" to keep you aware of where your rig and other objects are.
- **THE ONLY TIMES YOU MAY TRAVEL WITH THE DERRICK OF THE RIG IN THE PARTIAL OR FULLY RAISED POSITIONS ARE WHEN:**

The surface between the locations is generally flat, no overhead wires are in the area, no public traffic is in the area, and the next location is no more than 300 feet away. If a rig is moving with the derrick or spindle in the up position, a spotter must be at the rear of the rig.

- Do not raise the derrick or operate the rig if the distance to overhead power lines is less than 10 feet. A general rule of thumb is the distance between the overhead power line and the boom should not be less than the height of the boom.

Remember to " **ALWAYS LOOK UP** ".

And don't forget that power lines can and will move when it is windy. Always keep a close eye on the power lines when they are moving due to the wind. If the lines move too close to the rig, you should stop work and consider having the local utility

company cover the power lines or wait for the winds to die down before you begin boring again.

- Do not leave the equipment running or idling unattended. The vibrations from the rig may cause the rig to move accidentally.
- “Tailgate” safety meetings must be held once a week. In addition, these meetings must be documented.

Pre-Subsurface Exploration Preparation And Initial Exploration

Before you do the rest of the pre-subsurface exploration preparations, you should review each item listed below at **each and every** subsurface exploration location.

- If you are working in an exclusion zone, proper barricades should be placed around it.
- You must set the brakes before the subsurface exploration activities begin. If you are working on a steep grade, the wheels should be chocked to keep the rig from tipping over or moving. The level jacks should also be used to keep the rig stable during the exploration.
- To keep the rig jacks from sinking, you should place blocks under rig jacks.
- If you are working on the mast above five feet, you should use a safety harness. If you can, you should lower the mast so fall protection does not become an issue when working on the mast.
- You should also inspect the rig pulley sheaves for wear and proper cable/rope positioning.

After you complete the pre-boring preparation, the following items should be reviewed with your fellow employees:

- You must **make sure** that every employee knows the location of the “kill switch” and how to use it.
- While the engine is being started, the rig personnel and bystanders must stand clear of the rig.
- Before you start the rig engine, you should double-check to make sure that all gear boxes are in neutral, that every hydraulic lever is in the correct non-actuating position, that the cathead rope is not on the cathead, and that all of the hoist levers are disengaged.
- You should check the brakes and the hydraulic system on the derrick by raising it a few inches to see if it holds or bleeds off.

- **YOU MUST ALWAYS CHECK FOR OVERHEAD POWER LINES.**
- Place the fire extinguisher in an easily accessible location.

Subsurface Exploration

This section of the safety plan is where the most severe accidents can happen. These items need to be reviewed regularly with crew chiefs and technicians:

- Only necessary and authorized personnel should be in the exclusion zone during subsurface exploration operations.
- Hard hats, ear plugs, gloves, safety glasses, and steel-toed boots (weather permitting) should be worn at all times during augering or boring operations.
- Every employee should wear safety goggles when welding, grinding, chipping, or hammering on metal. Safety glasses or goggles must be worn on any job where there is a hazard to the eyes.

Every employee should also:

- Wear protective gloves when handling cable, augers, rods, or any sharp, jagged or splintery materials.
- Wear appropriate personal protective equipment as outlined in the site health and safety plan, such as proper gloves for different chemicals.
- Wear noise protection if the employee is working around the boring operations and if necessary.
- Never perform maintenance activities or refueling while equipment is running.
- Never, ever work in a lightning storm.
- Be trained in the use of hand signals and knows what each means.
- Never climb the mast when the equipment is running.

In addition:

- Only qualified personnel should operate the rig.
- The hydraulic lines should be inspected periodically for signs of leaks.

- A shovel should be used to place soil next to or away from auger when a test boring is being backfilled or advanced. You should never use to feet to kick soil toward or away from the auger -- whether it is rotating or stationary.
- You should stand clear of the auger or rod during rotation. Never clean the auger flight with your hand while the auger rotates.
- You should always use the proper tools for the job.
- You should be absolutely sure that the person acting as technician is clear of all moving parts before you start to auger or bore.

You should also:

- Use caution when erecting, operating, or moving equipment in or near an area where other people are working.
- Keep the job site clear of all debris, and move tools or equipment out from under foot.
- When using a hoist or cable, be sure all employees are out of the danger zone and use extreme caution.
- Never carry hand tools loosely in your pockets when you are working on the overhead mast.
- Never throw or drop any material or tool from overhead; instead, lower it with a rope or carry it down.
- Use a hoisting elevator to remove the rod from the hole. Do not use a pipe wrench as an elevator, and be sure that all of the wrenches are removed from rod before hoisting overhead.
- Visually inspect the rope daily for abrasions, broken fibers, cuts, fraying, or other defects. If the examination reveals any of the above defects, a new rope must be placed in service and the old rope should be discarded.
- Keep all tools, equipment, and trucks in good repair.
- Respect the equipment you are working with in the same manner as a loaded gun. Do not take chances because of familiarity.
- If you consider a site or a situation unsafe, Do Not Continue the Work until you bring your concern to the attention of your supervisor. When the site or situation is corrected, you may continue to work.

- Place lighted barricades at all obstructions left overnight in congested areas.
- In the case of emergency, know where your designated safe area is. Pre-planned evacuation routes are paramount. Know where your equipment is you do not run into it when you are evacuating a site in an emergency.
- Put the derrick and spindle down and all jacks or outriggers up when moving the rig between locations. It's standard procedure.

THE ONLY TIMES YOU MAY TRAVEL WITH THE DERRICK OF THE RIG IN THE PARTIAL OR FULLY RAISED POSITIONS ARE WHEN:

The surface between the locations is generally flat, no overhead wires are in the area, no public traffic is in the area, and the next location is no more than 300 feet away. If a rig is moving with the derrick or spindle in the up position, a spotter must be at the rear of the rig.

Decontamination of Equipment

Because decontaminating subsurface exploration tooling involves high-pressure equipment, hot water, and heavy equipment, it can be **dangerous**. To keep yourself safe, remember to:

- Obtain the proper permits when required to use the steam cleaner. such as a "hot work" permit.
- Follow the decontamination requirements given in the Health and Safety Plan. When the Health and Safety Plan does not apply, follow company policies.
- Chock the wheels before you decontaminate the equipment.
- When decontaminating equipment, proper personal protective equipment should be worn to prevent possible contact with contaminants or debris.
- Inspect the steam cleaner before starting to decontaminate the equipment, looking for leaking hoses or other possible defects that may injure employees or bystanders.
- **Never** point the wand toward your body or another person when the steam cleaner is in use.
- In cold weather, use an antifreeze solution to keep the water from freezing on or inside the equipment.
- Maintain good housekeeping at all times while cleaning equipment.

- When dealing with heat and hot water from the steam cleaner, **be careful -- be cautious.**
- Other items of concern are slipping due to water on plastic, the hazards of lifting heavy equipment (**REMEMBER -- “LIFT WITH YOUR LEGS AND NOT YOUR BACK”**), and sharp edges on augers and other boring equipment.

Well Construction

When you're constructing wells, you should always make sure that:

- Wastewater, drilling fluids and soil cuttings are properly contained and labeled if required. The site-specific health and safety plan specifications should be followed if applicable.

Safety and Housekeeping

- The subsurface exploration tools should be organized and secure before you move to the next location.
- Gasoline and other flammable materials should be stored in approved containers.
- Gas cylinders should be stored upright and securely. When cylinders are not in use, their protective caps should be in place.
- No horseplay will be tolerated on the job site.

Demobilization

The job is over, and it's time to go home. You and the rest of the crew are probably tired and in a hurry to go home. But don't let your haste get you into trouble! As you know, accidents are more likely to happen when you're tired and in a rush. That's why, when the job is done, you should:

- Allow plenty of time to demobilize.
- Review the day's activities and make sure your paperwork is in order and complete before you leave the job site.
- Secure and clean up the site before you leave.

- Follow Department of Transportation rules and regulations when traveling.

REMEMBER:
AT BOWSER-MORNER,
WE ARE COMMITTED TO SAFETY!

SUBSURFACE EXPLORATION EQUIPMENT CHECKLIST

RIG EQUIPMENT NUMBER _____

ITEM	CONDITION		REMARKS
	PASS	FAIL	
Backup Alarms			
Test Kill Switch			
Auger Racks			
Fire Extinguishers			
First Aid Kit			
Leveling Jacks			
Parking Brakes			
Brakes			
Horn			
Cable Safety			
Engine Gauges			
Guards			
Clutch			
Lights/Turn Signals			
Hydraulic Systems			
Muffler/Exhaust			
Ropes			
Mirrors			
Seat Belts			

SUBSURFACE EXPLORATION EQUIPMENT CHECKLIST

(CONTINUED)

RIG EQUIPMENT NUMBER_____

[illegible]

Read Date:

5/13/2013

Job Number	Client:	Project:	Mix No	Type	Remarks
161814	HRI Infrastructure	ASR Analysis	1	ASR C 1260	
161814	HRI Infrastructure	ASR Analysis	2	ASR C 1260	
161870	Aggregates USA	ASR Analysis	1	ASR C 1260	
161876	Mulzer Crushed Stone	Temple Quarry	1	ASR C 1260	
161938	Luck Stone Corporation	ASR Mitigation	1	ASR C 1567	
161938	Luck Stone Corporation	ASR Mitigation	2	ASR C 1567	

DOCUMENTATION OF CONCRETE PERFORMANCE

PIQUA CONCRETE CORP.

Concrete Proportions and Properties

MIX No.: CLASS-S OPTION 1

SPECIFIED STRENGTH: 4500

SPECIFIED SLUMP: 2-4

TOTAL AIR CONTENT: 4.5-7.5

UNIT WEIGHT: YD.

WATER/CEMENT RATIO: 0.44

Class S, Opt. 1
Material Code:
21506
PCJMF: 04608-01

COMPONENT:	QUANTITY:	DESCRIPTION:
CEMENT, LBS.	608	<u>Holsum</u>
FLYASH, LBS.	107	CEMEX -TYPE I
WATER, LBS.	315	FLYASH DIRECT
#57 GRAVEL, LBS	1320	POTABLE
SAND, LBS.	1060	BARRETT SAND & GRAVEL
EUCON WR75	2-3 OZ/CWT	BARRETT SAND & GRAVEL
AIR MIX 200	4-8%	EUCLID / ASTM C494 / TYPE A
#8"S GRAVEL LBS	320	EUCLID / ASTM C260
		BARRETT SAND & GRAVEL

APPENDIX D

QUALITY ASSURANCE PROJECT PLAN

**QUALITY ASSURANCE PROJECT PLAN FOR
Valley Asphalt, 1901 Dryden Road, Moraine, Ohio
Prepared by Bowser Morner, Inc.**

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**QUALITY ASSURANCE PROJECT PLAN FOR
Valley Asphalt, 1901 Dryden Road, Moraine, Ohio
Prepared by Bowser-Morner, Inc.**

A. PROJECT MANAGEMENT ELEMENTS

A.I TITLE AND APPROVAL SHEET

Valley Asphalt, 1901 Dryden Road, Moraine, Ohio
Quality Assurance Project Plan
Prepared by Bowser-Morner, Inc.

VALLEY ASPHALT APPROVALS

Dan Crago, Environmental Manager, Valley Asphalt	Date
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USEPA APPROVALS

Steve Renninger, Region 5 On-Scene Coordinator Superfund Division	Date
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A.2 DISTRIBUTION LIST

- Leslie Patterson, U.S. Environmental Protection Agency, Remedial Project Manager
- Laura Marshall, Ohio Environmental Protection Agency (OEPA), Project Coordinator

A.3 PROJECT/TASK ORGANIZATION

The following list identifies key individuals and organizations participating in this project, and discusses their specific roles and responsibilities as they pertain to this Quality Assurance Project Plan (QAPP).

On-Site Coordinator – Steven Renninger, USEPA

Responsibilities: Manages the Removal Program under USEPA's Superfund Program. Manages the overall Removal Project. Reviews and approves the QAPPs for this project.

Project Coordinator – Katherine H. Beach, R.E.M., Bowser-Morner, Inc.

Responsibilities: Supervise and schedule field staff conducting sample collection and site assessment activities. Assures that staff are qualified and trained to perform the work, familiar with the required Standard Operating Procedures (SOP), including those related to Quality Assurance/Quality Control (QA/QC), and have the equipment necessary to perform the work. Reviews reports generated by staff for completeness, clarity and accuracy. Prepare formal reports for Valley Asphalt and USEPA staff review and approval.

Project Manager – Dan Crago, Environmental Manager, Valley Asphalt

Responsibilities: Oversight of site-specific activities as they relate to this QAPP, including correspondence, communication and scheduling. Review and approve plans,

reports, and data to ensure that site-specific activities conducted pursuant to this QAPP meet project-specific Data Quality Objectives (DQOs).

Project Field Supervisor – Jeff Arp, Senior Hydrogeologist, Bowser-Morner, Inc.

Responsibilities: Prepare and/or implement site-specific sampling plans to collect environmental samples according to established SOPs at Site. Conduct sample collection by appropriate methods to provide data of sufficient quality. Prepare and/or implement health and safety plans for investigations conducted by Bowser-Morner at potential and/or confirmed hazardous substance sites. May prepare formal reports of sampling investigations for USEPA staff to evaluate.

QA/QC Manager – Mark Bingman, Bowser-Morner, Inc.

Responsibilities: Reviews site-specific QAPPs and other documents as needed to ensure quality data. Performs field audits of staff who conduct sampling activities in order to verify that staff are following the SOPs for environmental data collection. Prepares audit reports summarizing procedures used and makes recommendations for improvement, if necessary.

A.4 PROBLEM DEFINITION/BACKGROUND

The USEPA Vapor Intrusion Program, administered by the USEPA, Emergency Response Program, provides parties with technical assistance and oversight for the investigation and cleanup of properties contaminated with hazardous substances. The goal of this project is to eliminate the imminent hazard to human health (volatile organic compound vapor intrusion and methane vapor) generated by the completed pathways into three buildings on the Valley Asphalt property.

In accordance with a Unilateral Administrative Order issued by the U.S. Environmental Protection Agency (EPA), Valley Asphalt must include a Quality Assurance Program Plan in a Work Plan. This QAPP will be reviewed by the USEPA; modifications, if necessary, will be made by Valley Asphalt within 10 business days. The environmental data generated during implementation of the Work Plan must include

appropriate quality management tools. A Quality Management Plan (QMP) is being developed concurrently with this QAPP and covers monitoring and measurement activities that generate and process environmental data this Site as it complies with the UAO.

A.5 PROJECT/TASK DESCRIPTION

The Valley Site entered the USEPA Vapor Intrusion Mitigation Program when the UAO became effective (April 16, 2013). Valley will complete all work required in the UAO; Work Plan, Work Plan elements, removal action plans and a final report are/will be submitted to the USEPA for review and approval. When the USEPA is satisfied that the removal activities have met the objectives of the UAO, the USEPA will provide Valley with a Certification of Completion or "No Further Action Letter" signed by the Director of the Hazardous Waste Program. Valley will pay for the USEPA's oversight costs, which are calculated on an hourly basis. Participation in the program is not voluntary and Valley may not withdraw at any time.

Activities that may be conducted under this QAPP and with the oversight of the USEPA include site characterization and removal actions. These activities will be documented through work plans and final reports, all submitted to the USEPA for review and approval. The following include the necessary components for work plans to conduct environmental data collection submitted for USEPA approval and the necessary QA/QC documentation to be submitted after data collection.

A.5.1 WORK PLANS FOR SITE CHARACTERIZATION

Bowser-Morner will submit the written site-specific work plan to USEPA for review and approval prior to implementation. The work plan will a health and safety (HASP) plan, signature page and reference to this generic QAPP. The work plan will provide general site information, describe the number, type, and location of samples to be collected (included on a site sketch) as well as analytical parameters and methods requested for each sample.

A.5.2 CHARACTERIZATION REPORTS

Bowser-Morner will submit the written site-specific characterization report to the USEPA upon completion of site characterization activities. These reports will include field QA/QC documentation requirements and laboratory QA/QC documentation requirements as described in Section A.8 Documents and Records.

A.5.3 MITIGATION PLAN

Since the Mitigation Plan involves environmental data collection such as further site characterization, confirmatory samples following removal activities, and monitoring, then the Mitigation Plan shall be subject to this QAPP. Bowser-Morner will submit the written site-specific Mitigation Plan to USEPA for review and approval prior to implementation. These plans will include a sampling and analysis plan, a field sampling plan, documentation of the health and safety plan, signature page and reference to this generic QAPP. The plan will provide general site information, describe the number, type, and location of samples to be collected (included on a site sketch) as well as analytical parameters requested for each sample. If the RAP/RMP does not involve environmental sampling, then data QA/QC would not be a component.

A.5.4 MITIGATION REPORTS

Since the Mitigation Plan involves environmental sampling, Bowser-Morner will submit to the USEPA a written site-specific report that includes field QA/QC documentation requirements and laboratory QA/QC documentation requirements as described in Section A.8 Documents and Records.

A.5.5 MODIFICATIONS TO THE WORK PLAN

USEPA will have the final approval of all individual components of the written work plan revised as specified herein and reserves the right to require modifications, deletions, and or additional elaboration to the written work plans and reports as USEPA deems necessary.

A.5.5.1 USEPA REQUESTED CHANGES

If USEPA determines that modifications to the written work plan are necessary or desired, the agency will document the requested changes to Bowser-Morner in writing. Such changes may include the need for additional sampling at the site. Based on the written instructions provided by USEPA, Bowser-Morner will revise the written work plan.

A.5.5.2 BOWSER-MORNER REQUESTED CHANGES

If Bowser-Morner determines that modifications to the written work plan are necessary, Bowser-Morner will submit a written request to USEPA for changes. The written request will include the reason for the modification and will detail Bowser-Morner's proposed changes to the written work plan. USEPA will review the written request of Bowser-Morner and send written notice of approval or disapproval of the request to Bowser-Morner.

A.5.5.3 FIELD DEVIATIONS FROM THE WORK PLAN

Changes in site conditions between the time of the site reconnaissance and the on-site removal activities and/or the visual appearance of the substance at the time of sampling may determine the actual number and locations of samples collected. The deviations or changes will be documented in the final report prepared by Bowser-Morner and submitted to the USEPA.

A.6 DATA QUALITY OBJECTIVES AND CRITERIA

Data Quality Objectives are qualitative and quantitative statements that specify the purpose, quality, and/or quantity of the environmental data required to support management and removal decisions at the site. DQOs are predicated in accordance with the anticipated end uses of the data that is to be collected. Data collected typically will be used to meet the following DQOs:

- Determine if there is an immediate threat to public health or the environment.

- Locate and identify potential sources of contamination.
- Characterize the extent of impact from contamination.
- Determine if there is a long-term risk from exposure to the site.
- Determine potential remediation and long-term stewardship strategies (if necessary).

When analyzing environmental samples, all measurements will be made so that results are reflective of the medium and conditions being measured. The level of detail and data quality needed will vary with the intended use of the data. DQOs typically are assessed by evaluating the precision, accuracy, representativeness, completeness, and comparability of all aspects of the data collection process, defined as follows:

- **Precision:** a measure of the reproducibility of analytical results.
- **Accuracy:** a measure of the bias that exists in a measurement system.
- **Representativeness:** degree that sampling data accurately and precisely depicts selected characteristics such as parameter variations at a sampling point or an environmental condition.
- **Completeness:** measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under “normal” conditions.
- **Comparability:** degree of confidence with which one data set can be compared to another. To assess if environmental measurements are of an appropriate quality, the general requirements above will be examined and compared to agency-recommended parameters when available. Calculation of precision and accuracy will be specified in the site specific work plan. Samples will be collected in a manner so they are representative of both the chemical composition and physical state of the sample at the time of sampling. To ensure comparability, all data will be reported as °Celsius (flash point), pH units, µg/l or mg/l for water, liquids, µg/kg or mg/kg for soil, sediment or other solids, and mg/m³ and/or ppbv for air. Comparability is further addressed by using appropriate field and laboratory methods that are consistent with current standards of practice as approved by EPA.

A.7 SPECIAL TRAINING/CERTIFICATION

Sample collectors have successfully complete a 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) site safety course in accordance with 40 CFR Part 311, which references 29 CFR 1910.120. Sample collectors have successfully completed annual 8-hour HAZWOPER refresher courses; certificates are available upon request. Staff are also trained on sampling for hazardous materials, to read and be familiar with applicable SOPs, the generic QAPP, the site-specific work plan(s) prior to performing actual sample collection.

Specific training requirements may be necessary for personnel operating field analytical or sampling equipment or specialized equipment. Manufacturer's requirements and recommendations will be followed.

Bowser-Morner will ensure and provide for the protection of the personal safety and health of all its workers on site, including the selection, provision, testing, decontamination, and disposal of all Personal Protective Equipment (PPE) and any required medical monitoring. Bowser-Morner will comply with all applicable worker safety and health laws and regulations. At all times during performance of services, Bowser-Morner will exercise reasonable professional judgment regarding safety and will use professional judgment as a criterion for cessation of services for safety reasons.

A.8 DOCUMENTS AND RECORDS

Documentation procedures will be conducted in accordance with EPA's record keeping requirements. Work plans and final reports will be generated and submitted to USEPA for review and approval. Field QA/QC documentation for site characterization reports and/or removal action/risk management reports must consider the following details:

- Calibration and maintenance records for field instrumentation,
- Documentation of sample collection procedures,

- Reporting of any variances made in the field to sampling plans, SOPs or other applicable guidance documents,
- Reporting of all field analysis results,
- Documentation of sample custody (provide copies of chain-of-custody documents),
- Documentation of sample preservation, handling and transportation procedures,
- Documentation of field decontamination procedures (and if applicable, collection and analysis of equipment rinsate blanks),
- Collection and analysis of all required duplicate, replicate, background and trip blank samples, and
- Documentation of disposal of investigation-derived wastes.

Laboratory QA/QC documentation for site characterization reports and/or removal action/risk management reports must consider the following details:

- If the published analytical method used specifies QA/QC requirements within the method, those requirements must be met and the QA/QC data reported with the sample results;
- At a minimum, QA/QC samples must consist of the following items (where applicable): method/instrument blank, extraction/digestion blank, initial calibration information, initial calibration verification, continuing calibration verification, laboratory fortified blanks/laboratory control samples, duplicate, and matrix spikes/matrix spike duplicates;
- Documentation of appropriate instrument performance data such as internal standard and surrogate recovery.

B: DATA GENERATION AND ACQUISITION

B.1 SAMPLING PROCESS DESIGN

This QAPP is generic, covering many different projects and a large number of analytes in various complex sample matrices. The sampling design will vary depending on the goal of the sampling activity, such as site characterization or confirmatory sampling. Therefore, the sampling process design will be described in detail in the site-specific work plan. Some considerations when developing a plan for a sampling design,

particularly a judgmental sampling design, include potential contaminant(s) and locations based on past property uses, soil properties that affect contaminant migration, physical and chemical nature of potential contaminant(s), the manner in which contaminant(s) may have been released, and timing, duration and amount of potential release(s).

All QC samples will be collected in accordance with EPA guidance and described in the site-specific work plan. All QC samples will be documented in the sampling report. See Section B.5 for more information on QC samples.

B.2 SAMPLING METHODS

The field investigations and sample collection activities under the project will adhere to applicable SOPs and available EPA guidance and will be described in the site-specific work plan. The site-specific work plan will indicate the location, type, number and media of the samples. Manufacturer's specifications and operational instructions, other agency SOPs, other methods, instructions, including professional or scientific technical standards, may also be used for specific field analytical equipment, geophysical equipment, surveying instruments, etc. with no existing SOPs or EPA guidance upon approval of the USEPA Project Manager. The site-specific work plan will specify sampling methodologies and procedures used.

B.3 SAMPLE HANDLING AND CUSTODY

Sample handling and custody will be accomplished according to SOPs and using standard forms developed by Valley's selected laboratory. Sample container selection will be according to appropriate method guidance and/or SOPs. The site-specific work plan will specify sample handling procedures, sample containers, preservation, holding times, chain-of-custody and field documentation, handling of samples in the field, and transport of samples to the laboratory. All analyses will be conducted within the EPA-specified maximum sample holding time limits. Any data obtained from analyses conducted on samples after the specified holding time limit will be qualified by the laboratory in sample result documentation and discussed in the sampling report.

B.4 ANALYTICAL METHODS

Field analytical measurements will be according to SOPs and manufacturer's operational instructions, such as immunoassay kit instructions, photoionization detector (PID) instructions, XRF manual, etc. Calibration and other QA/QC actions will be accomplished according to SOPs, manufacturer's minimum recommendations/requirements and other appropriate scientific or technical standards. Appropriate EPA guidance, SOPs, best professional judgment and accepted industry and scientific practices will be used when correlating field analytical data to definitive data. Laboratory measurements will be performed by the selected laboratory according to the method requested, generally according to EPA Solid Waste Methods SW-846 specified container, preparation and analytical methods. The QC procedures specified in these methods must be followed. The detection limits of the selected analytical methods generally will be able to achieve the concentrations of interest needed. Analytical parameters will vary by project; therefore, the analytical methods used for the parameters of concern will be specified in the site-specific work plan.

All QC documentation must be provided with each analytical deliverable package. Bowser-Morner will be responsible for ensuring all analytical data provided by Valley Asphalt's selected laboratory for the project meets the contract requirements and the requirements of this QAPP.

B.5 QUALITY CONTROL

QC samples will be required to verify the validity of analytical results and to assess whether the samples were contaminated from sources not directly attributable to releases at the site (such as improper decontamination, cross-contamination, laboratory contamination, etc.). Field QC samples may include trip blanks, field blanks, equipment blanks/rinsate samples, replicates/field duplicates as appropriate. The field QC samples proposed for collection will be included in the site-specific work plan. Trip blanks indicate if any activities after obtaining the trip blank may have contaminated samples during transport. Field blanks are samples obtained in the field to determine if

contaminants were introduced by sample containers, preservatives, sampling procedures, etc. Replicate samples may be obtained to assess the reproducibility of the sampling procedures, data obtained and the analytical methods. Rinsate samples are obtained to verify adequate decontamination of sampling equipment. For all projects involving the collection of aqueous samples, a trip blank will be included at a frequency of one per separate sampling event (mobilization). An equipment rinsate blank will be collected for projects where the sampling equipment is decontaminated in the field for reuse. The equipment rinsate blank will be collected at a frequency of one per separate sampling event (mobilization) for each different combination of sampling equipment, decontamination method, and analytical parameter.

Contaminants will not be detected above the laboratory reporting level in trip blanks, field blanks, and equipment rinse blanks. Any data that do not meet these accuracy criteria will be qualified on sample results. The USEPA Project Manager and Bowser-Morner personnel will evaluate all qualified data on a project-specific basis, and determine how/whether to use the data.

Total precision of the entire sampling and analytical process will be assessed using analyses of blind field duplicate and replicate split samples. Aqueous precision QC samples will be collected as duplicates, while non-aqueous precision QC samples will be sampled as replicate splits.

At least one set of precision QC samples for each media of interest in this project (which may include any of the following: groundwater, surface water, soil/sediment, air) will be collected per site. All QC samples will be documented in the sampling report, and will be collected at a frequency in accordance with applicable SOPs.

Laboratory QC samples include duplicates, spikes, laboratory blanks, and performance evaluation samples, and are performed by the fixed laboratory according to the approved laboratory QA/QC plans.

B.6 INSTRUMENT/EQUIPMENT TESTING, INSPECTION AND MAINTENANCE

Field analytical instruments used during this project will be maintained and calibrated according to instructions provided by the instrument manufacturer, and other appropriate scientific and technical guidance and standards pertinent to the specific instrument in use. Bowser-Morner will be responsible for performing operational checks on all equipment prior to use in the field. An operational problem with any field instrumentation will be noted by Bowser-Morner in the field notebook. Daily or regular calibration of field instrumentation will be according to applicable SOPs and manufacturer's instructions and indicated or referenced in the site-specific work plan. Fixed laboratory equipment for contract laboratories used for quantitative sample analysis will be tested, inspected, calibrated and maintained according to the specific analytical equipment requirements as stated in the SOPs of the laboratory, in accordance with manufacturer-specified procedures or method-specified procedures, as appropriate.

B.7 INSTRUMENT/EQUIPMENT CALIBRATION AND FREQUENCY

Maintenance and calibration procedures will be conducted in accordance with manufacturers' instrument manuals, method-specified procedures and the laboratory SOPs, as appropriate.

B.8 INSPECTION/ACCEPTANCE OF SUPPLIES AND CONSUMABLES

Inspection and acceptance of supplies and consumables will be conducted according to applicable SOPs. Any supplies and consumables used in the sample collection process or instrument calibration such as sample bottles, bailers, dedicated tubing, deionized water, calibration gases, etc., will be inspected upon receipt and prior to use.

B.9 NON-DIRECT MEASUREMENTS

Several types of data and information may be obtained from non-measurement sources for use in projects conducted under this QAPP. The primary types of non-measurement data are Phase I Environmental Site Assessments, site reconnaissance, interviews of site owners or operators, published reference books and resources, databases, and internet resources. These data may be used to design sampling plans and may be used with the directly measured data collected during each project to evaluate the potential need for further site characterization, remediation and/or suitability for development. Non-direct measurement data will be documented and referenced in any document for which they are used.

B.10 DATA MANAGEMENT

Data management, including chain-of-custody review and correction, data review, reduction and transfer to data management systems, quality control charts, quality control procedures, and sample receipt, storage and disposal, will be in accordance with applicable SOPs and accepted industry practices.

Documentation will be in accordance with applicable SOPs and accepted industry practices, and will include the sampling reports, copy of the chain-of-custody, and field QA controls with the analytical results. All sample documents will be legibly written in ink. Any corrections or revisions to sample documentation shall be made by lining through the original entry and initialing and dating any changes. Data reduction will occur in accordance with Bowser-Morner analytical SOPs for each parameter. If difficulties are encountered during sample collection or sample analyses, a brief description of the problem will be provided in the sampling report prepared by Bowser-Morner. Data reporting will be in accordance with applicable SOPs and will include, at a minimum:

- Sample documentation (location, date and time of collection and analysis, etc.)
- Chain-of-custody forms
- Initial and continuing calibration

- Determination and documentation of detection limits
- Analyte(s) identification
- Analyte(s) quantitation
- Quality Control sample results
- Duplicate results

Adequate precautions will be taken during the reduction, manipulation, and storage of data in order to prevent the introduction of errors or the loss or misinterpretation of data.

C: ASSESSMENT AND OVERSIGHT

C.1 ASSESSMENTS AND RESPONSE ACTIONS

This section describes the internal and external checks necessary to ensure that all elements of the QAPP are implemented correctly as prescribed, that the quality of the data generated by implementation of the QAPP is adequate, and that any necessary corrective actions are implemented in a timely manner.

C.1.1 LABORATORY PERFORMANCE ASSESSMENT

Laboratories will comply with all of the EPA and the National Environmental Laboratory Accreditation Conference (NELAC) requirements for laboratory QA programs. Data resulting from the participation in this program shall be reviewed by the laboratory Quality Assurance Manager and any problems shall be addressed.

C.1.2 FIELD PERFORMANCE ASSESSMENT

The auditor in charge of field QA will conduct audits of field activities according to Bowser-Morner QA field auditing procedures. The process of choosing when field audits are conducted is not based on a particular project or site-sampling event, but rather on assuring that each person involved in sample collection is audited at least once per year. Bowser-Morner's field QA auditor will have the responsibility for initiating and implementing response actions associated with findings identified during the field audit. The field personnel shall properly address any response actions needed.

C.1.3 OVERALL QAPP ASSESSMENT

EPA conducts periodic evaluations of the state's environmental programs. These evaluations normally include some type of review of the program's quality management system, and may include examination of QAPPs.

C.1.4 DATA VALIDATION

All field and laboratory data will be subject to validation to review for accuracy, precision, completeness, representativeness and comparability. Data validation is discussed in more detail in Section D. The acceptance criteria for measurement data are discussed in Section A.6.

C.2 REPORTS TO MANAGEMENT

Data from Valley Asphalt's selected laboratory will be submitted to the USEPA Project Manager as an appendix to the final report using the laboratory analytical report sheets. The report sheets will include documentation of the sampling location, sample description, date of collection, collector, analysis performed and results, date of analysis, and analytical method used. A copy of the chain-of-custody and the lab results will also be attached to the final report. In addition, an explanation of any deficiencies in data quality will be provided with the sampling report.

Field performance assessment audits will be documented by Bowser-Morner's field QA auditor in a written report that will be kept on file at Bowser-Morner's office. Results from the laboratory's audit studies will be kept on file at Bowser-Morner's office.

Comments and recommendations from the appropriate EPA Region periodic evaluations of state environmental programs are provided to the DEQ QA manager and used by DEQ management and staff to take any corrective actions which may be.

D: DATA VALIDATION AND USABILITY

D.1 DATA REVIEW, VERIFICATION AND VALIDATION

To ensure that measurement data generated when performing environmental sampling activities are of an appropriate quality, all data will be validated. Data validation is a systematic procedure for reviewing a body of data against a set of established criteria to provide a specified level of assurance of its validity prior to its intended use. The techniques used must be applied to the body of the data in a systematic and uniform manner. The process of data validation must be close to the origin of the data, independent of the data production, and objective in its approach. All data, as applicable, will be validated in accordance with EPA guidance, per Data Quality Objectives Process. Any deviations will be documented and provided with the analytical data report.

D.2 VERIFICATION AND VALIDATION METHODS

D.2.1 DOCUMENTATION, DATA REDUCTION AND REPORTING

Documentation will include the sampling reports, copy of the chain-of-custody, and field QA controls with the analytical results. Data reduction will occur in accordance with the laboratory's analytical SOPs for each parameter. If difficulties are encountered during sample analyses, a brief description of the problem will be provided.

Data derived from sampling events undertaken for projects under the oversight of the USEPA will be reported to the USEPA Project Manager as discussed in Section C.2. Reports to Management.

D.2.2 DATA VALIDATION

Data validation will occur as described in the analytical SOPs for each parameter and the laboratory SOPs for data review. Data validation is accomplished using control charts and data review checklists. Discrepancies are noted in the analytical file and

appropriate data flags are used. If data is determined to be outside of control limits, the data is flagged on the report of analysis. The laboratory personnel will look at matrix spikes/matrix spike duplicates, lab blanks, and lab duplicates to ensure they are acceptable. The sample collector will compare the sample descriptions with the field sheets for consistency and ensure that any anomalies in the data are documented. Bowser-Morner will perform a final review and approval to ensure that the data meets the quality objectives of this QAPP. Bowser-Morner's review and approval is a check on the reviews conducted by the laboratory to ensure consistency of all field and analytical data that is generated by Bowser-Morner.

D.3 RECONCILIATION WITH USER REQUIREMENTS

Once the final report is submitted, the USEPA Project Manager will review the field duplicates to determine if they appear to indicate a problem with meeting quality objectives. If problems are indicated, the USEPA Project Manager will contact Bowser-Morner to discuss and attempt to reconcile the issue. Completeness will also be evaluated to determine if the completeness goal for this project has been met. If data quality indicators do not meet the project's requirements as outlined in this QAPP, the data may be discarded and re-sampling may occur. The USEPA Project Manager will determine the cause of the failure (if possible) and make the decision to discard the data and re-sample. If the failure is tied to the analyses, calibration and maintenance techniques will be reassessed as identified by the appropriate lab personnel. If the failure is associated with the sample collection and re-sampling is needed, the sampling methods and procedures will be reassessed as identified by the field audit process. Corrective action will be undertaken by all parties to address specific problems as they arise. Corrective actions required will be identified through the use of control charts for chemical analyses, precision and accuracy data, through performance auditing, and through systems audits.

REFERENCES

- EPA Guidance for Representative Sampling, OSWER Directives 9360.4-10 and 9360.4-16, December 1995.
- EPA Guidance for Quality Assurance Project Plans, EPA/600/R-98/018, February 1998.
- EPA Guidance for Data Quality Assessment, EPA/600/R-96/084, January 1998.
- EPA Guidance for Data Quality Objectives Process, EPA/600/R-96/055, September 1994.

APPENDIX A: LISTING OF ACRONYMS & TERMS

USEPA Brownfields/Voluntary Cleanup Program
CERCLA- Comprehensive Environmental Response, Compensation and Liability Act
DQO- Data Quality Objectives
EPA- United States Environmental Protection Agency
HAZWOPER- Hazardous Waste Operations and Emergency Response
MCL- Maximum Contaminant Level
NELAC- National Environmental Laboratory Accreditation Conference
QA- Quality Assurance
QAPP- Quality Assurance Project Plan
QC- Quality Control
SOP- Standard Operating Procedure
SVOC- Semi-Volatile Organic Compound
VOA- Volatile Organic Analysis
VOC- Volatile Organic Compound

Duplicate or co-located sample is a sample obtained from the same location, at the same time, and of the same material as the original sample. Duplicate water samples are used primarily to assess precision associated with sampling methodology, and to a lesser extent sample heterogeneity and analytical procedures. Duplicate soil samples are used primarily to determine the variability or heterogeneity of the sampled media. Due to the heterogeneity of soils, caution must be used if attempting to assess precision associated with sampling methodology or analytical procedures.

Hazardous Substance means a substance defined as hazardous pursuant to federal rule 40 CFR 302.4, which includes asbestos and Polychlorinated Biphenyls (PCBs); any substance designated pursuant to Section 311(b)(2)(A) of the federal Water Pollution Control Act; any toxic pollutant listed under Section 307(a) of the federal Water Pollution Control Act; any hazardous air pollutant listed under Section 112 of the Clean Air Act; any imminently hazardous chemical substance or mixture with respect to which the Administration of EPA has taken action pursuant to Section 7 of the Toxic Substances Control Act; any hazardous waste; any hazardous material designated by the Secretary of the U.S. Department of Transportation under the Hazardous Materials Transportation Act; any radioactive materials; or any petroleum product.

Hazardous waste means waste defined to be hazardous pursuant to federal rule 40 CFR 261.

Replicate split sample is obtained by dividing or splitting one sample that has been mixed or homogenized into two samples for separate analysis. A replicate split is collected primarily to assess precision associated with analytical procedures and to a lesser extent sample handling procedures. Replicate split samples of soils or other nonaqueous materials are not recommended if volatile organics analyses are requested due to the potential loss of the volatiles during the mixing process. Duplicate samples for volatile organics analyses are sometimes collected prior to mixing, however, there may

be a greater potential for inconsistency due to the heterogeneous nature of soils or other non-aqueous media.

APPENDIX B: ANALYTICAL REQUIREMENTS

The detection limits, as specified in 40 CFR 136 Appendix A and the EPA SW-846 Methods, are sufficient for most project under the oversight of the USEPA. The accuracy and precision of each analytical method are determined by using spikes and spike duplicate analyses, as specified in the EPA SW-846 methods.

APPENDIX E

COMPLETED BUILDING PHYSICAL SURVEYS FOR BUILDINGS REQUIRING MITIGATION

FORM 1: BUILDING PHYSICAL SURVEY QUESTIONNAIRE

Date: June 22, 2011 Time: 15:15 Inspector: Adam Loney, CRA

Address: 1903 Dryden Road Site Layout: Parcel Number: 5054 Building: 2

Building Owner: Valley Asphalt (W. Jorgensen II)

Occupant Name: Valley Asphalt Plant No. 6

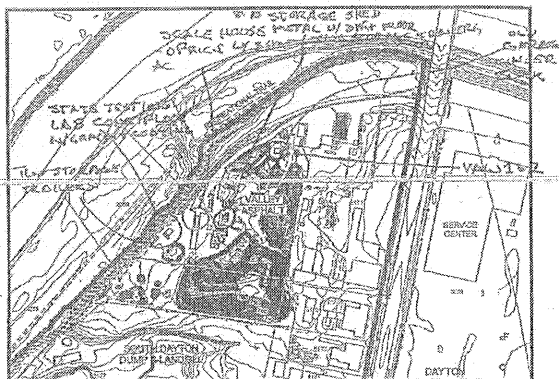
Contact Name: Dan Craig/Bill Hurst

Phone Number: 737-419-9562

Time resident/employed in home/building? vacant

Occupation: Hot Mix Asphalt Plant

Number and Age of Occupants Adults: 0
Children: 0



BUILDING TYPE: One-Story ☒ Two-Storey ☐ Multi-Storey ☐ Brick/~~Concrete~~ Siding ☒ Stucco ☐ (Circle One) Residential ☒ Commercial ☐ Multi-use ☐ Other (specify) ☐

If residential, what type (circle): Single family / Condo / Multi-family / Other (specify) ☐

If multiple units, how many? N/A

If commercial, what is the business? Valley Asphalt Plant storage Hours of Occupation/Occupancy: unoccupied 10 hrs

Does the commercial property include residences (i.e., multi-use)? Y ☒ N ☐

If yes, how many? N/A

DESCRIBE BUILDING: steel double arch geoset hnt w/ brick YEAR CONSTRUCTED: pre-1959

Is the building insulated? Y ☒ N ☐ How air tight? Tight / Average / ☒ Not Tight

Previous Uses: Titus Construction, Ohio State, possibly Ottosen Edvent, Dayton Recycling

WEATHER SEALS: General Condition: Good ☐ Fair ☐ Poor ☐ Not Present ☒

Are doors/windows kept open to allow for outdoor-to-indoor air exchange? several windows in geoset hnt are broken

BASEMENT: None ☐ ☒ Finished Unfinished Depth below reference Floor covering point (meters)

PARTIAL ☐ ☐ ☐

Full ☐ ☐ ☐

Crawl space ☐ N/A N/A

Slab-on-grade ☒ ☐ ☐ N/A carpet in offices

Is the basement/bottom floor used as a living/work space area? (circle) Y ☒ N ☐ storage only

Number of floors at or above grade: 1 Floor

Depth of basement below grade: N/A ft. Basement Size: 4888 ft²

FORM 1: BUILDING PHYSICAL SURVEY QUESTIONNAIRE

Foundation construction: Poured concrete ☒ Concrete block ☐ Cinder block ☐ Stone ☐

Foundation walls: Poured ☒ Block ☐ Stone ☐ Other steel walls above poured base

Foundation walls: Unsealed ☒ Sealed ☐ Sealed with _____

Integrity of foundation walls: Good ☐ Fair ☐ Poor ☒

The basement/bottom floor is: Wet ☐ Damp ☐ Dry ☒ Moldy ☐ *carpet in office area is moldy/musty - strong odor. Carpet in bad condition*

Any visual evidence of leakage through basement/bottom floor walls or floor Yes ☐ No ☒

Floor Construction: Poured concrete ☒ Wood ☐ Earth ☐ Brick ☐ Other: _____

Floor condition (cracks, drains): cracks visible in open shop portion unsealed joints

Condition at floor/wall joint (if visible): _____

Any exterior openings from the basement/bottom floor:

☒ Vents ☒ Fans ☒ Windows

☒ Wall openings ☒ Utility pipe penetrations ☒ Other: bay + main doors

Type of ground cover outside of building: grass / concrete / asphalt / other (specify): gravel

Sub-slab vapor/moisture barrier in place? Yes ☐ (No) ☒ Don't know ☐ Type of barrier: _____

RADON SYSTEM: ☐ Yes ☒ No Is the system active or passive? Active / Passive

Do you have a sump?: Yes ☐ No ☒ Where: N/A (show on figure)

If yes, sealed ☐ open ☐ NA ☒ If yes, is there water in the sump?: Yes ☐ No ☒ N/A

Have there ever been a fire in the building?: Yes ☐ No ☒ no visual evidence of one

If yes, describe its location and extent: N/A

Is there a laundry room located inside the house/building?: Yes ☐ No ☒

If yes, describe its location: N/A

WATER AND SEWAGE

Is this building serviced with municipal water? Yes ☒ No ☐

Water well present?: Yes ☒ No ☐ Don't know ☐ Is well used for drinking water? Yes ☐ No ☒

Well location: YAL-1 N/A-2 (show on figure) What do you use the well for?: doesn't service bldg.

Do you have a cistern?: Yes ☐ No ☒ Don't know ☐

If yes, describe its location: N/A

Do you have a septic system?: Yes ☐ No ☒

If yes, describe its location: N/A (show on figure)

If yes, describe how septic system is cleaned: N/A

GARAGE: Is there an attached garage? ☐ Yes ☒ No Describe: _____

FORM 1: BUILDING PHYSICAL SURVEY QUESTIONNAIRE

HEATING, VENTILLATION, AND AIR CONDITIONING

Type of heating system(s) used (circle all that apply, note primary)

Hot air circulation ☒ Heat pump ☐ Hot water baseboard ☐
in office area
 Space heaters ☐ Stream radiation ☐ Radiant floor ☐
 Electric baseboard ☐ Wood stove ☐ Outdoor wood boiler ☐

FURNACE: Location: _____

Type: Gas ☒ Forced air ☒ Wood ☐
 Oil ☐ Hot water ☐ Propane ☐
 Electric ☐ Coal ☐ Other: _____

Does furnace have outside combustion air vent? yes thru roof

Do you have a fireplace? Yes ☐ No ☒ Does fireplace have an outside combustion air vent? Yes ☐ No ☒

Do you use kerosene space heaters? Yes ☐ No ☒

AIR CONDITIONER: None ☒ Central ☐ Window units ☐

(If yes, which rooms and capacities?) N/A

*doesn't the office area
have AC? ~~to roof mounted or~~
yes, ground unit ~~window units observed~~
outside east wall*

SPILL/CONTAMINANT SOURCE INFORMATION

Visual evidence of spills/releases: _____

Type of petroleum/VOC release? _____

When did the release occur? _____

What areas of the building have been impacted by the release? _____

Are there any odors? ☐ Yes ☐ No If yes, describe the odors: _____

Where are the release-related odors found? _____

Photo	Direction	Subject
323	southeast	- building exterior showing construction details + broken windows at right
324	southwest	- exterior of Quonset hut portion
371	west	- office interior
372+373	south	- furnace room
374	west	- warehouse interior
375	east	- former drain + bay doors in warehouse area
376	north	- office/whse dividing wall w/ cracks b/w blocks
377	southeast	- staining, dampness + deterioration of floor at door b/w office + warehouse

FORM 1: BUILDING PHYSICAL SURVEY QUESTIONNAIRE

Building Layout:

Parcel Number 5054; Building 2

Mark the following on the below Figure: Additions or Modifications; door/windows/loading docks kept open for air exchange; building compartmentalization, including size and locations of compartments

PARID: J44 04102-0040

PARCEL LOCATION: 1901 DRYDEN RD

NBHD CODE: C1302000

1 of 4

A MULTI-USE OFFICE, 988 Sq. Ft.

B ULTI USE STORAGE, 3900 Sq. Ft.



CONESTOGA-ROVERS
& ASSOCIATES

PROJECT NO. 030443-61-02

DATE 12/15/11

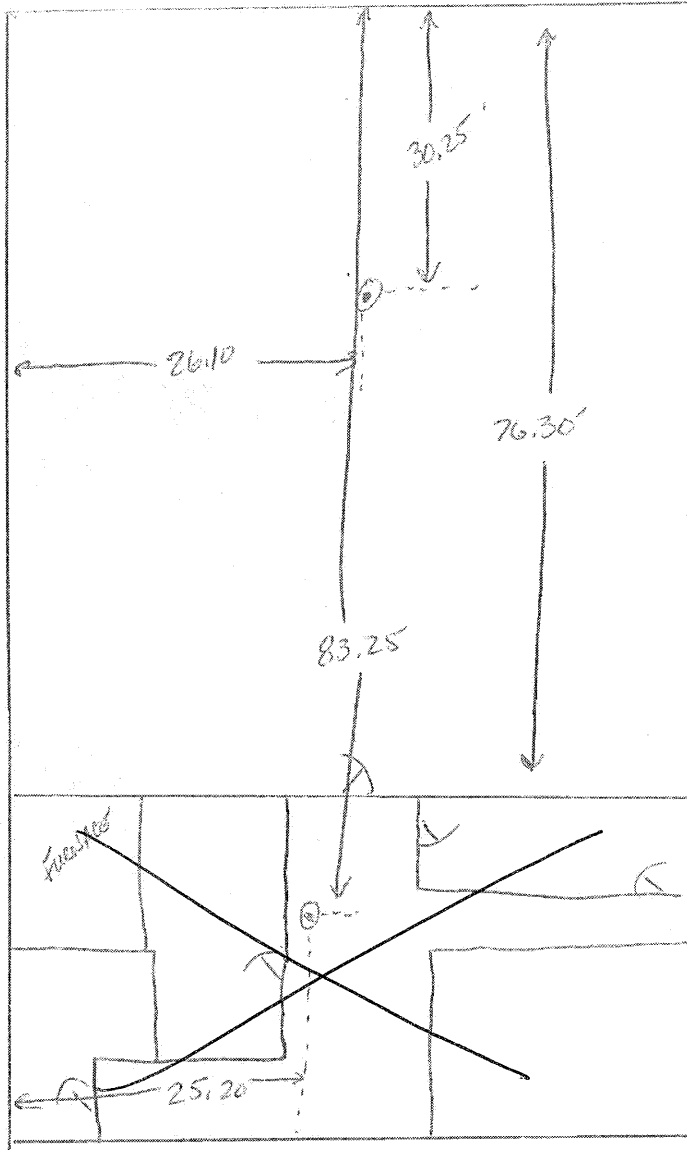
PROJECT NAME South Dayton

CHECKED BY

DESIGNED BY GTL

PAGE OF

QUANZA Hut



BUILDING 2 PARCEL 5054

STORAGE AREA SUB-SLAB COMPLETION FORM
QUANZA HAZ

A

Sub-Slab Probe ID: PROBE A (STORAGE AREA)

Address: 1903 DRYDEN RD

Date Installed: 12/15

Time Installed: 1100

Sampling Personnel: G. LEWIS

Area Layout

J. YORK

Description of Room: HI-BAY GARAGE

STORAGE

Concrete Condition: POOR / STAINED / ROUGH / CRACKED

Concrete Thickness: 6 3/4" inches

Depth of Sample Hole: 10 1/4" inches

Probe Length: 6 1/2" inches

CO₂ Value: 0.1%

O₂ Value: 21.1 - 21.0

LEL: CH₄ 1.0 ~ 30%^{PEAK} SUSTAIN 10%

PID: 55.3 PEAK SUSTAIN 20 - 35 ppm

Notes: SUBSTANTIAL AIR MONITORING DURING DRILLING

USED WATER (~ 2 TSP) DURING DRILLING TO COOL

Photographs: BIT DUE TO CH₄ CONCERNS

FORM 1: BUILDING PHYSICAL SURVEY QUESTIONNAIRE

Date: June 22, 2011 Time: 14140 Inspector: Adam Loney, CRA

Address: 1901 Dryden Road Site Layout: Parcel Number: 5054 Building: 4

Building Owner: Jim Jurgensen II

Occupant Name: Valley Asphalt Plant No. 6

Contact Name: Dan Crajo, Bill Hurst

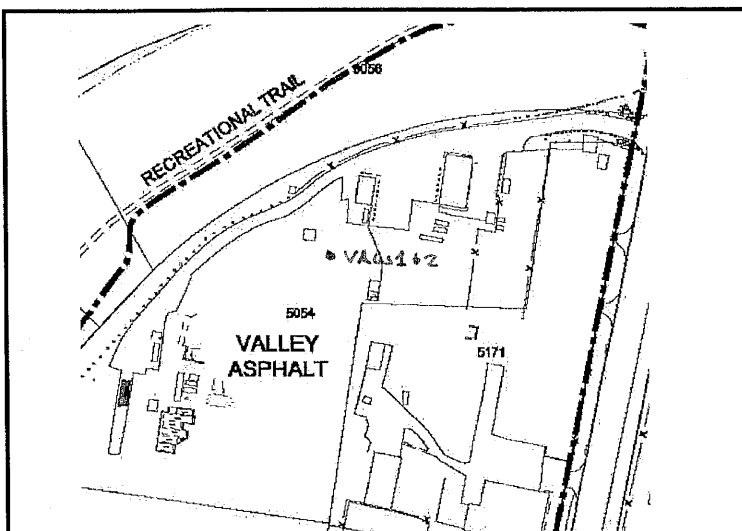
Phone Number: 937-479-9568

Time resident/employed in home/building? pre-1993

Occupation: Hot Mix Asphalt Plant

Number and Age of Occupants Adults: 2

Children: 0



BUILDING TYPE: One-Story Two-Storey ☒ Multi-Storey Brick concrete foundation Siding Stucco

(Circle One) Residential / Industrial / Commercial / Multi-use / Other (specify) _____

If residential, what type (circle): Single family / Condo / Multi-family / Other (specify) _____

If multiple units, how many? N/A

If commercial, what is the business? control building for asphalt plant Hours of Occupation/Occupancy? _____

Does the commercial property include residences (i.e., multi-use)? Y (N)

If yes, how many? _____

DESCRIBE BUILDING: poured concrete on top single block base w/ pre-fab type office possible visible in 1988 & 1991 AERIALS DEFINITELY VISIBLE IN 1993 AERIAL YEAR CONSTRUCTED: pre-1993

Is the building insulated? Y/N on top office maybe How air tight? Tight / Average / Not Tight

Previous Uses: same as existing

WEATHER SEALS: General Condition: Good _____ Fair ☒ Poor _____ Not Present _____

Are doors/windows kept open to allow for outdoor-to-indoor air exchange? door to basement kept open

BASEMENT/ BOTTOM FLOOR	None	<input type="checkbox"/> Finished	<input checked="" type="checkbox"/> Unfinished	Depth below reference point (meters)	Floor covering
Partial	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>~1.5</u>	<u>none</u>
Full	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Crawl space	<input type="checkbox"/>	<u>N/A</u>	<u>N/A</u>		
Slab-on-grade	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

Is the basement/bottom floor used as a living/work space area? (circle) Y (N)

Number of floors at or above grade: 1

Depth of basement below grade: ~4 ft. Basement Size: 160 ft²

FORM 1: BUILDING PHYSICAL SURVEY QUESTIONNAIRE

Foundation construction: Poured concrete ☒ Concrete block ☐ Cinder block ☐ Stone ☐

Foundation walls: Poured ☒ Block ☒ Stone ☐ Other _____

Foundation walls: Unsealed ☒ Sealed ☐ Sealed with _____

Integrity of foundation walls: Good ☒ Fair ☐ Poor ☐

The basement/bottom floor is: Wet ☐ Damp ☐ Dry ☒ Moldy ☐

Any visual evidence of leakage through basement/bottom floor walls or floor Yes ☐ No ☒

Floor Construction: Poured concrete ☒ Wood ☐ Earth ☐ Brick ☐ Other: _____

Floor condition (cracks, drains): good condition

Condition at floor/wall joint (if visible): no visible leaks

Any exterior openings from the basement/bottom floor:

☐ Vents ☐ Fans ☐ Windows
☐ Wall openings ☒ Utility pipe penetrations ☒ Other: man-door

Type of ground cover outside of building: grass / concrete / asphalt / other (specify): _____

Sub-slab vapor/moisture barrier in place? Yes ☐ ~~(No)~~ / Don't know _____ Type of barrier: _____

RADON SYSTEM: ☐ Yes ☒ No Is the system active or passive? Active / Passive

Do you have a sump?: Yes ☐ No ☒ Where: N/A (show on figure)

If yes, sealed ☐ open ☐ NA ☒ If yes, is there water in the sump?: Yes ☐ No ☐ N/A

Have there ever been a fire in the building?: Yes ☐ No ☒

If yes, describe its location and extent: N/A

Is there a laundry room located inside the house/building?: Yes ☐ No ☒

If yes, describe its location: N/A

WATER AND SEWAGE

Is this building serviced with municipal water? Yes ☐ No ☒

Water well present?: Yes ☒ No ☐ Don't know ☐ Is well used for drinking water? Yes ☐ No ☐

Well location: VAW1, VAW2 see figure (show on figure) What do you use the well for?: washroom, truck washing

Do you have a cistern?: Yes ☐ No ☒ Don't know ☐

If yes, describe its location: N/A

Do you have a septic system?: Yes ☒ No ☒

If yes, describe its location: (septic tank) (show on figure)

If yes, describe how septic system is cleaned: pumped as needed

GARAGE: Is there an attached garage? ☐ Yes ☒ No Describe: _____

HEATING, VENTILLATION, AND AIR CONDITIONING

Hot air circulation	<input type="checkbox"/>	Heat pump	<input type="checkbox"/>	Hot water baseboard	<input type="checkbox"/>
Space heaters	<input type="checkbox"/>	Stream radiation	<input type="checkbox"/>	Radiant floor	<input type="checkbox"/>
Electric baseboard	<input checked="" type="checkbox"/>	Wood stove	<input type="checkbox"/>	Outdoor wood boiler	<input type="checkbox"/>

Type: Gas ☐ Forced air ☐ Wood ☐
Oil ☐ Hot water ☐ Propane ☐
Electric ☒ Coal ☐ Other: _____

Do you use kerosene space heaters? Yes ☐ No ☒

(If yes, which rooms and capacities?) control room only

Where are the release-related odors found? N/A

Subject

FORM 1: BUILDING PHYSICAL SURVEY QUESTIONNAIRE

Building Layout:

Parcel Number 5054; Building 4

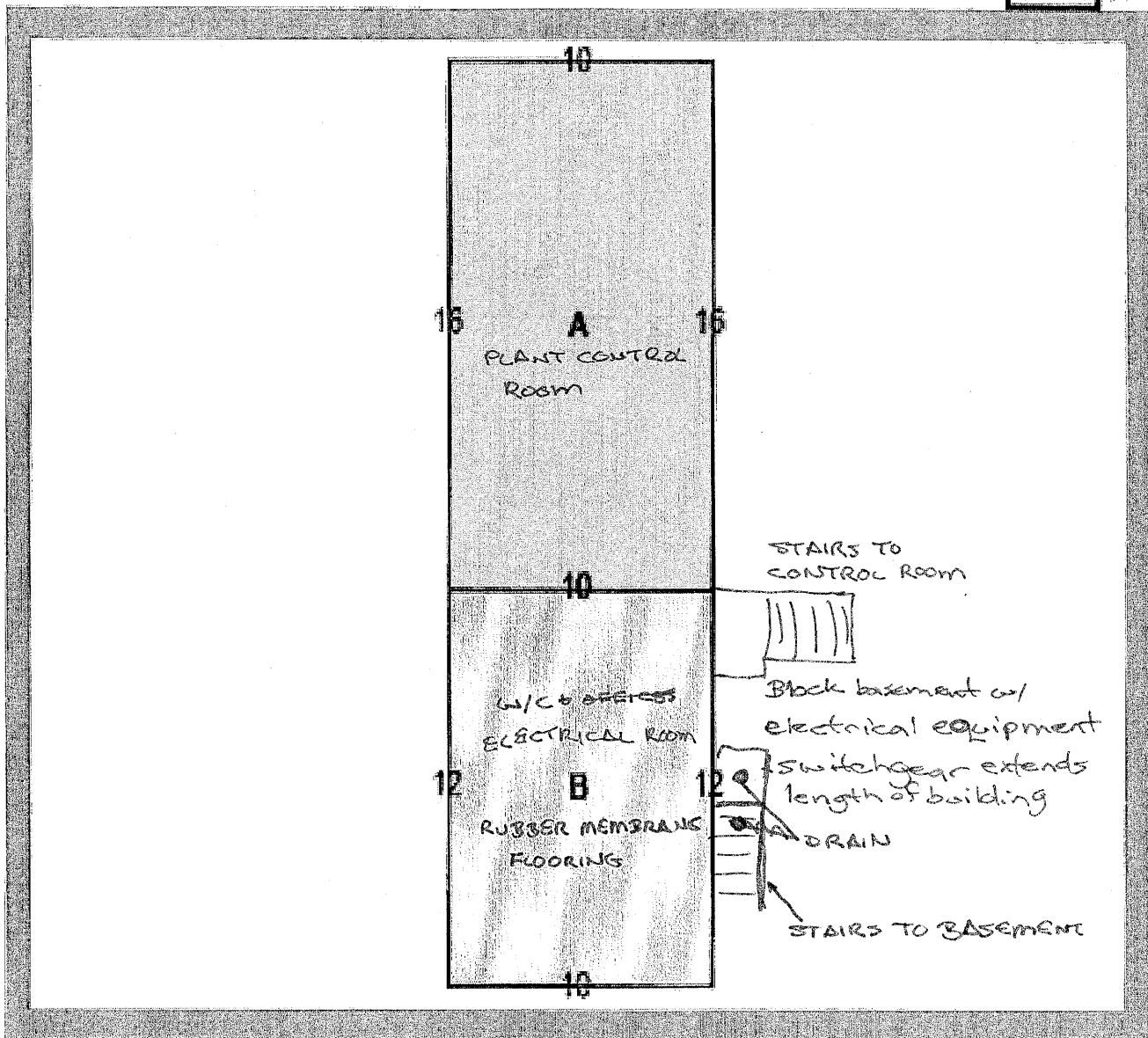
Mark the following on the below Figure: Additions or Modifications; door/windows/loading docks kept open for air exchange; building compartmentalization, including size and locations of compartments

PARID: J44 04102 0040

PARCEL LOCATION: 1901 DRYDEN RD

NBHD CODE: C1302000

1 of 4



A SUPPORT AREA, 160 Sq. Ft.

B MULTI-USE OFFICE, 120 Sq. Ft.

FORM 1: BUILDING PHYSICAL SURVEY QUESTIONNAIRE

Date: June 22, 2011 Time: 14:30 Inspector: Adam Loney, CRA

Address: 1901 Dryden Road Site Layout: Parcel Number: 5054 Building: 5

Building Owner: Jim Jurgensen II

Occupant Name: Valley Asphalt Plant No. 6

Contact Name: Dan Crago, Bill Hurst

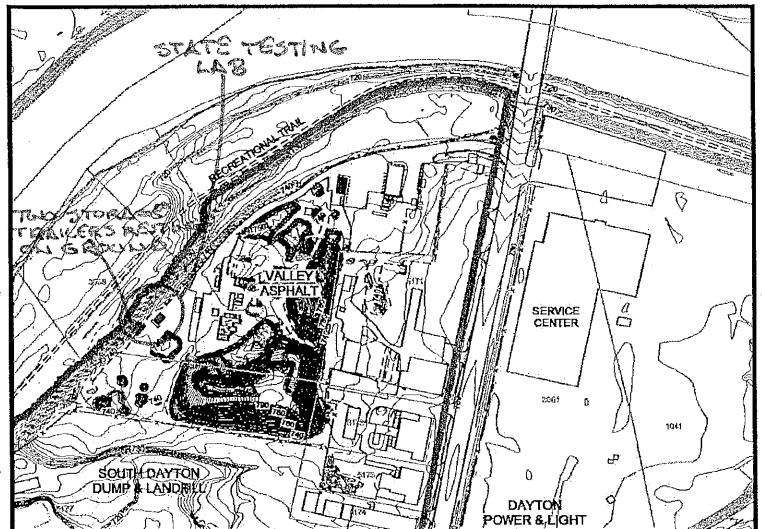
Phone Number: 937-479-9568

Time resident/employed in home/building? ~1950s

Occupation: Hot mix asphalt plant

Number and Age of Occupants Adults: ~4 but varies

Children: 0



BUILDING TYPE: One-Story ☒ Two-Storey ☐ Multi-Storey ☐ Brick ☒ Siding ☒ Stucco ☐
(Circle One) Residential / Industrial / Commercial / Multi-use / Other (specify) _____

If residential, what type (circle): Single family / Condo / Multi-family / Other (specify) _____

If multiple units, how many? N/A

If commercial, what is the business? Asphalt Plant, State testing lab Hours of Occupation/Occupancy? rarely used

Does the commercial property include residences (i.e., multi-use)? Y / ☒ N

If yes, how many? N/A - visible in current location in 1993
- visible in aerial photo in original location near present office building 1968

DESCRIBE BUILDING: single storey, steel cladding, block on slab YEAR CONSTRUCTED: pre-1968, moved pre-1993

Is the building insulated? Y/N don't know How air tight? Tight / Average / Not Tight

Previous Uses: former office before it was moved to present location

WEATHER SEALS: General Condition: Good ☐ Fair ☒ Poor ☐ Not Present ☐

Are doors/windows kept open to allow for outdoor-to-indoor air exchange? not typically, windows inoperable

BASEMENT/: None ☐ ☒ Finished Unfinished Depth below reference point (meters) Floor covering

BOTTOM FLOOR

Partial ☐ ☐ ☐ _____

Full ☐ ☐ ☐ _____

Crawl space ☐ N/A N/A _____

Slab-on-grade ☒ ☐ ☐ N/A coated/painted concrete

Is the basement/bottom floor used as a living/work space area? (circle) ☒ Y / N

Number of floors at or above grade: 1

Depth of basement below grade: N/A ft. Floor Basement Size: ~594 ft²

FORM 1: BUILDING PHYSICAL SURVEY QUESTIONNAIRE

Foundation construction: Poured concrete ☒ Concrete block ☐ Cinder block ☐ Stone ☐

Foundation walls: Poured ☐ Block ☒ Stone ☐ Other steel cladding

Foundation walls: Unsealed ☒ Sealed ☐ Sealed with painted

Integrity of foundation walls: Good ☒ Fair ☐ Poor ☐

The basement/bottom floor is: Wet ☐ Damp ☐ Dry ☒ Moldy ☐

Any visual evidence of leakage through basement/bottom floor walls or floor Yes ☐ No ☒

Floor Construction: Poured concrete ☒ Wood ☐ Earth ☐ Brick ☐ Other: _____

Floor condition (cracks, drains): some cracks visible

Condition at floor/wall joint (if visible): okay, thin cracks

Any exterior openings from the basement/bottom floor:

☒ Vents ☒ Fans ☒ Windows
☐ Wall openings ☒ Utility pipe penetrations ☒ Other: man doors x 2

Type of ground cover outside of building: grass / concrete / asphalt / other (specify): gravel

Sub-slab vapor/moisture barrier in place? Yes ☒ No ☐ Don't know ☐ Type of barrier: _____

RADON SYSTEM: ☐ Yes ☒ No Is the system active or passive? Active / Passive

Do you have a sump?: Yes ☐ No ☒ Where: N/A (show on figure)

If yes, sealed ☐ open ☒ NA ☒ If yes, is there water in the sump?: Yes ☐ No ☒ N/A

Have there ever been a fire in the building?: Yes ☐ No ☒ no evidence of one

If yes, describe its location and extent: N/A

Is there a laundry room located inside the house/building?: Yes ☒ No ☐

If yes, describe its location: N/A

WATER AND SEWAGE

Is this building serviced with municipal water? Yes ☐ No ☒

Water well present?: Yes ☒ No ☐ Don't know ☐ Is well used for drinking water? Yes ☐ No ☒

Well location: VAW1 + VAW2, see figure (show on figure) What do you use the well for?: washrooms, truck wash

Do you have a cistern?: Yes ☐ No ☒ Don't know ☐

If yes, describe its location: N/A

Do you have a septic system?: Yes ☐ No ☒

If yes, describe its location: N/A (show on figure)

If yes, describe how septic system is cleaned: N/A

GARAGE: Is there an attached garage? ☐ Yes ☒ No Describe: N/A

HEATING, VENTILLATION, AND AIR CONDITIONING

Hot air circulation	<input checked="" type="checkbox"/>	Heat pump	<input type="checkbox"/>	Hot water baseboard	<input type="checkbox"/>
Space heaters	<input type="checkbox"/>	Stream radiation	<input type="checkbox"/>	Radiant floor	<input type="checkbox"/>
Electric baseboard	<input checked="" type="checkbox"/>	Wood stove	<input type="checkbox"/>	Outdoor wood boiler	<input type="checkbox"/>

Type: Gas ☒ Forced air ☒ Wood ☐
 Oil ☐ Hot water ☐ Propane ☐
 Electric ☒ Coal ☐ Other: _____

Do you use kerosene space heaters? Yes ☐ No ☐

(If yes, which rooms and capacities?) control room only lab + office

Where are the release-related odors found? N/A

[illegible]

FORM 1: BUILDING PHYSICAL SURVEY QUESTIONNAIRE

Building Layout:

Parcel Number 5054; Building 16

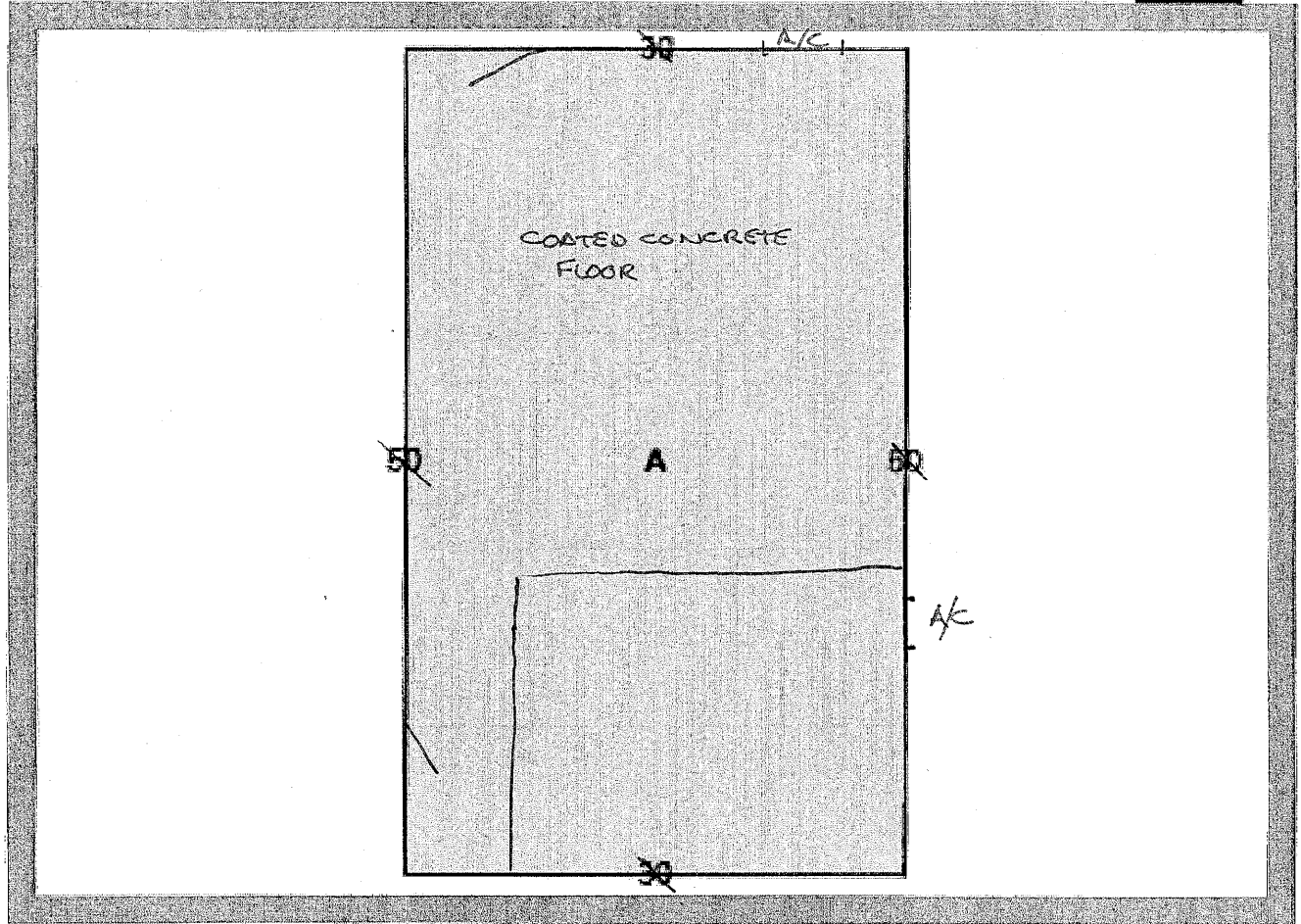
Mark the following on the below Figure: Additions or Modifications; door/windows/loading docks kept open for air exchange; building compartmentalization, including size and locations of compartments

PARID: J44 04102 0040

PARCEL LOCATION: 1901 DRYDEN RD

NBHD CODE: C1302000

1 of 4



A MULTI-USE OFFICE, ±500 Sq. Ft.
~594

APPENDIX F

MITIGATION SUMMARY DATABASE

VALLEY ASPHALT ON-SITE MITIGATION SUMMARY DATABASE SOUTH DAYTON DUMP AND LANDFILL SITEMORaine, MONTGOMERY COUNTY, OHIO

Number on Map	Building Address	Owner Name & Address	Occupant Name & Address	Other Party(ies) Requiring Notification	Parcel/Building No.	Comments/ Structure	Type	Methane Screening Level	TCE Screening Levels (10 ⁶ levels)		Date Sampled By CRA			Mitigation Decision	Comments from Previous Meeting(s)	Date Sample Result Letter Mailed	Date of Initial Mitigation Meeting	Date of Mitigation Recon Meeting (SSDS Subcontractor)	Date Mitigation Plan Submitted to U.S. EPA	Approval Date of U.S. EPA Mitigation Plan	Date of SSDS Installation	Post-Mitigation Radius of Influence Vacuum Readings	30-day Proficiency SS/IA Sampling	180-day Proficiency SS/IA Sampling	1-year Proficiency SS/IA Sampling	Date O&M Manual finalized	Date of 1-year SSDS Inspection	Date of SSDS upgrade (if necessary)
									Sub-Slab (in ppb)	Indoor Air (in ppb)	January, March, August, and September 2012																	
											Max Methane in Sub-Slab	Max TCE Sub-Slab (in ppb)	Max TCE Indoor Air (in ppb)															
1	1901 Dryden Road	James Jurgensen Valley Asphalt Corporation 11641 Mosteller Road Cincinnati, OH 45241	Dan Crago Valley Asphalt Corporation 11641 Mosteller Road Cincinnati, OH 45241	Tina Ortiz Mark Fornes Realty, Inc. 7755 Paragon Rd. Suite 106 Dayton, OH 45459	3054 Building 1	Valley Asphalt: On slab; Vacant	Non-Residential	0.5%	20	2	ND	2,700	8.1	(5/22/13) Demolition (current deadline of 7/31/13 dependant on results of lead and asbestos testing)	(5/30/13) •No ACMs. •Waiting on lead data.	UPS on 10-23-12; Receipt verified 5/1/13	4/24/13	N/A	4/26/13	5/21/13 (conditional)								
2	1903 Dryden Road	James Jurgensen Valley Asphalt Corporation 11641 Mosteller Road Cincinnati, OH 45241	Dan Crago Valley Asphalt Corporation 11641 Mosteller Road Cincinnati, OH 45241	Tina Ortiz Mark Fornes Realty, Inc. 7755 Paragon Rd. Suite 106 Dayton, OH 45459	3054 Building 2	Valley Asphalt: Storage Building on slab Valley Asphalt to conduct partial demo (demo front, office portion of bldg; leave storage/Quonset Hut)	Non-Residential	0.5%	20	2	8.8%	32	ND	•Mitigation - intrinsically safe SSDS for south portion (Quonset Hut) of building. •Mitigation system quotes due today (5/30/13) •Demolish north portion (office) part of building by 7/31/13, dependant on ACM, lead sampling results	(5/30/13) •ACMs found in flooring components. •Considering encasement. •Asbestos contractors to visit site week of 6/3/13	UPS on 10-23-12; Receipt verified 5/1/13	4/24/13	5/23/13	4/26/13	5/21/13 (conditional)								
3	1901 Dryden Road				3054 Building 3	Building was demolished in February 2012. Not shown on Figure								No Further Action required														
4	1901 Dryden Road	James Jurgensen Valley Asphalt Corporation 11641 Mosteller Road Cincinnati, OH 45241	Dan Crago Valley Asphalt Corporation 11641 Mosteller Road Cincinnati, OH 45241	Tina Ortiz Mark Fornes Realty, Inc. 7755 Paragon Rd. Suite 106 Dayton, OH 45459	3054 Building 4	Valley Asphalt: Pre-fab split level with unfinished basement	Non-Residential	0.5%	20	2	ND	200	ND	•Mitigation - SSDS •Mitigation system quotes due today (5/30/13)	(5/1/13) Valley considering installation of intrinsically-safe SSDS for all buildings (2, 4 and 5). If cost is not reasonable, initial SSDS will be designed to easily modify to intrinsically-safe if future monitoring indicates the need.	UPS on 10-23-12; Receipt verified 5/1/13	4/24/13	5/23/13	4/26/13	5/21/13 (conditional)								
5	1901 Dryden Road	James Jurgensen Valley Asphalt Corporation 11641 Mosteller Road Cincinnati, OH 45241	Dan Crago Valley Asphalt Corporation 11641 Mosteller Road Cincinnati, OH 45241	Tina Ortiz Mark Fornes Realty, Inc. 7755 Paragon Rd. Suite 106 Dayton, OH 45459	3054 Building 5	Valley Asphalt: On slab	Non-Residential	0.5%	20	2	ND	700	0.051	•Mitigation - SSDS •Mitigation system quotes due today (5/30/13)	(5/1/13) Valley considering installation of intrinsically-safe SSDS for all buildings (2, 4 and 5). If cost is not reasonable, initial SSDS will be designed to easily modify to intrinsically-safe if future monitoring indicates the need.	UPS on 10-23-12; Receipt verified 5/1/13	4/24/13	5/23/13	4/26/13	5/21/13 (conditional)								
6	1901 Dryden Road	James Jurgensen Valley Asphalt Corporation 11641 Mosteller Road Cincinnati, OH 45241	Dan Crago Valley Asphalt Corporation 11641 Mosteller Road Cincinnati, OH 45241	Tina Ortiz Mark Fornes Realty, Inc. 7755 Paragon Rd. Suite 106 Dayton, OH 45459	3054 Building 6	Valley Asphalt Tool trailer with concrete floor 2 windows remain open (via industrial screen in windows), allowing ventilation	Non-Residential	0.5%	NA - Methane monitoring only		ND	NA - Methane monitoring only		(5/30/13) Decision made last week to remove this building.	(5/30/13) Considering moving building shell to non-slab location	UPS on 10-23-12; Receipt verified 5/1/13	4/24/13	N/A	4/26/13	5/21/13 (conditional)								
7	1901 Dryden Road	James Jurgensen Valley Asphalt Corporation 11641 Mosteller Road Cincinnati, OH 45241	Jack Boesch and/or Bruce Mangoot B&G Equipment & Truck Repair, Inc. 1951 Dryden Road Moraine, OH 45439	Tina Ortiz Mark Fornes Realty, Inc. & Tim Hoffman Dinsmore & Shohl LLP	3054 Building 7	Unknown ownership. Located on two properties. Abandoned garage and storage	Non-Residential	0.5%	NA - Methane monitoring only		ND	NA - Methane monitoring only		(5/22/13) Demolition (current deadline of 7/31/13 dependant on results of lead and asbestos testing and removal of contents by owner)	•(5/30/13) ACMs in wallboard joint compound •Asbestos contractors site visit scheduled for week of 6/3/13	UPS on 10-23-12; Receipt verified 5/1/13	4/24/13	N/A	4/26/13	5/21/13 (conditional)								
MP	1901 Dryden Road	James Jurgensen Valley Asphalt Corporation 11641 Mosteller Road Cincinnati, OH 45241	Dan Crago Valley Asphalt Corporation 11641 Mosteller Road Cincinnati, OH 45241	Tina Ortiz Mark Fornes Realty, Inc. 7755 Paragon Rd. Suite 106 Dayton, OH 45459	3054 Building MP	Murphy's Plumbing - vacant	Non-Residential	Crawl space sampling only. No sub-slab sampling. Crawl space PCE = 38 ppb. IA PCE screening level is 25 ppb.				Crawl Space sampling only	0.091	(5/22/13) Demolition (current deadline of 7/31/13 dependant on results of lead and asbestos testing)	(5/30/13) No ACMs. Waiting on lead data.	UPS on 10-23-12; Receipt verified 5/1/13	4/24/13	N/A	4/26/13	5/21/13 (conditional)								

5/30/2013

Notes:

Results that are bolded and highlighted red are greater than the Ohio Department of Health screening levels.

NA = Not Analyzed
ND = Not Detected
ppb = Parts per billion
TCE = Trichloroethylene
PCE = Tetrachloroethene

APPENDIX G

EPA/VALLEY MEETING AGENDAS AND MINUTES

Meeting Minutes
Valley Asphalt Site, Moraine, Ohio
(South Dayton Dump & Landfill)

Meeting Date: May 1, 2013 Meeting Time: 3:00 pm – 3:40 pm

Attendees: ☒ Arp, Jeff (BMI) ☒ Sherrard, John (Dynamac)
☒ Crago, Dan (Valley) ☒ Renninger, Steve (USEPA, Region 5)
☐ Patterson, Leslie (USEPA, Region 5)
☒ Guest: Coleman, Dawn (BMI)
☐ Guest:

Facilitator: ☒ Katherine Beach, Bowser Morner, Inc. (BMI)

Discussions

1. Work Plan-

- a. Work Plan received by USEPA; under review. Steve and John will red-line, add comments and return back to Valley and Bowser by end of week.
- b. Extension for submittal of complete Work Plan approved for May 15, 2013.
- c. Work Plan should address the following issues:
 - i. In lieu of Access Agreement, include language indicating USEPA and its representatives are authorized to access the Site.
 - ii. Include IA and SS sampling during Performance Sampling.
 - iii. Provide detail in Performance Sampling section (§4.4).
 - iv. Clearly define "intrinsically safe" in the Mitigation Plan (§4.0).
 - v. Detail each proposed mitigation system and probe locations (§4.0 and Appendix *x*).
 - vi. Include item in Project Schedule (§7.0) for demolition activities (within *x* days).

2. Mitigation Database Summary Review-

- a. Update status, as appropriate, in "Comments" column.
- b. Add new column for Items Discussed During Weekly Meetings; update after each meeting, as appropriate.

3. Standard Conference Day/Time-

- a. Weekly teleconferences will be held each Thursday at 3:00 pm.
- b. Beach has sent standing invitation to meeting.

- c. Beach will send reminder email every Wednesday, including updated Mitigation Summary Database.
 - d. Beach will take Minutes each meeting.
 - e. Beach will distribute Minutes from each meeting the next working day.
 - f. Beach will modify the Mitigation Summary Database and forward to Sherrard by COB each Tuesday.
4. Other-
- a. Sherrard forwarded report "Summary of Results from 2012 Vapor Intrusion Study", Oct. 12, 2012 (thank you!).
 - b. QAPP Level II will be required.
 - c. During demolition activities, there is no need to purposefully break up the slab (which will be left in place).
 - d. Beach to send email (copy all) to Leslie Patterson asking whether there are restrictions in coring into the landfill (restrictions on who may core into the landfill or restrictions on coring into the landfill).
 - e. Valley's sister company is a demolition company and will be doing the demolition. Valley wants to move forward with demolition; moving through proper channels addressing possible ACMs, lead paint, etc.
 - f. Sherrard and Crago had building-specific comments that will be included in the next draft of the Mitigation Database Summary.

Action Items

1. USEPA to complete Work Plan review; send back to Valley. Due 5/3/13.
2. Valley to respond to Work Plan comments. Due 5/15/13.
3. Valley (Beach) to update Mitigation Summary Database, send to Sherrard. Due 5/7/13.
4. Valley (Beach) query L. Patterson i.e.: restrictions of coring into landfill.

Thank you for attending and being prepared. Please let me know if these minutes contain inaccuracies or misstatements.

Meeting Minutes
Valley Asphalt Site, Moraine, Ohio
(South Dayton Dump & Landfill)

Meeting Date: May 9, 2013 Meeting Time: 3:00 pm – 3:40 pm

Attendees: ☐ Arp, Jeff (BMI) ☒ Sherrard, John (Dynamac)
☒ Crago, Dan (Valley) ☒ Renninger, Steve (USEPA, Region 5)
☒ Patterson, Leslie (USEPA, Region 5)
☒ Guest: Marshall, Laura (OEPA, SWDO)
☐ Guest: Heck, Kelly (Valley)

Facilitator: ☒ Katherine Beach, Bowser Morner, Inc. (BMI)

Discussions

1. Work Plan-
 - a. Work Plan comments by USEPA received by Valley
 - b. Extension for submittal of complete Work Plan approved for May 15, 2013.
 - c. Work Plan should address the following issues:
 - i. In lieu of Access Agreement, include language indicating USEPA and its representatives are authorized to access the Site.
 - ii. Include IA and SS sampling during Performance Sampling.
 - iii. Provide detail in Performance Sampling section (§4.4).
 - iv. Clearly define “intrinsically safe” in the Mitigation Plan (§4.0).
 - v. Detail each proposed mitigation system and probe locations (§4.0 and Appendix x).
 - vi. Include item in Project Schedule (§7.0) for demolition activities (within x days).
2. Mitigation Database Summary Review-
 - a. Demolition tentatively planned for 3 or 4 structures:
 - i. Building 1
 - ii. Building 2 (recent inspection indicates demolition of front (office) portion of the building may be difficult, costly or impractical, as its shared wall with the back (Quonset Hut) portion is structurally connected; Valley re-assessing options)
 - iii. Building 7 (ownership of building verified to be Jack Boesch, who has given verbal authorization to demolish it)
 - iv. Building MP

- b. Steve indicated that demolition of building(s) down to the slab mitigates his (removal action) concerns and that no further action regarding the slabs is necessary.
- c. Demolition schedule is dependant on asbestos and lead surveys, which will be performed next Monday and Tuesday.
- d. Leslie verified that since the ultimate remedy for the site is a cap, leaving the slabs in place (after demolition) is acceptable.
- e. Mitigation is planned for 2 or 3 structures:
 - i. Building 2 (the back portion, the Quonset Hut, tentatively will be mitigated, pending Valley's assessment mentioned above
 - ii. Building 4
 - iii. Building 5
- f. Steve inquired whether Valley was still considering the installation of intrinsically safe mitigation systems in all buildings, to anticipate and prepare for possible, future appearance of methane in buildings where methane is not currently an issue. Dan replied that Valley is still considering this option.
- g. The area within Building 2 covers approximately 4,000 square feet. Guidance suggests that a single system typically can mitigate up to 1500 square foot. Steve suggested that a single fan may be able to be used for greater coverage if a manifold system was utilized.
- h. Building 6 was confirmed to be slab-on-grade; it does not have an earthen floor. This building is used for storage, is not inhabited and has constant ventilation via permanent screens in the building's two doors. No data is available to suggest that sub-slab or indoor air monitoring has taken place. Steve recommended that sub-slab sampling take place; the data generated will drive the removal decision.
- i. Steve requested that a photograph of Building 7 be distributed.

3. Other-

- a. In the comments received last week, it was noted that CRA would cease performing the weekly methane monitoring in Building 2. Valley has volunteered to perform the methane monitoring in Building 2 if necessary; Katherine is to contact CRA contact Adam Loney to discuss this issue.

Action Items

- 1. Valley to submit Work Plan to USEPA. Due 5/15/13.
- 2. Beach to invite Laura Marshall to teleconferences. Due 5/10/13.

Thank you for attending and being prepared. Please let me know if these minutes contain inaccuracies or misstatements.

Meeting Minutes
Valley Asphalt Site, Moraine, Ohio
(South Dayton Dump & Landfill)

Meeting Date: May 16, 2013 Meeting Time: 3:00 pm – 3:20 pm

Attendees: ☒ Arp, Jeff (BMI) ☐ Sherrard, John (Dynamac)
☒ Crago, Dan (Valley) ☒ Renninger, Steve (USEPA, Region 5)
☒ Patterson, Leslie (USEPA, Region 5)
☒ Marshall, Laura (OEPA, SWDO)
☒ Guest: Heck, Kelly (Valley)

Facilitator: ☒ Katherine Beach, Bowser Morner, Inc. (BMI)

Discussions

1. Work Plan-
 - a. VI Mitigation Work Plan was submitted to EPA May 15, 2013.
 - b. EPA to review and provide additional comments, as indicated.
 - c. Request to include clarifying language regarding intrinsically safe equipment to be used in Building 2.
 - d. Details for each proposed mitigation system and components will be shared with this team once provided by the mitigation system contractors.
 - e. Request that Bowser Morner provide an index to the files that have been sent via email.
 - f. Request to provide a list of mitigation contractors to Steve.
2. Mitigation Database Summary Review-
 - a. Demolition tentatively planned for 4 structures:
 - i. Building 1
 - ii. Building 2 front (office) portion of the building.
 - iii. Building 7 (ownership of building verified to be Jack Boesch, who has given verbal authorization to demolish it)
 - iv. Building MP
 - b. Demolition schedule is dependant on asbestos and lead survey results; sampling teams will be on-site 5/23/13.
 - c. Mitigation is planned for 3 structures:
 - i. Building 2 (back portion)
 - ii. Building 4
 - iii. Building 5

Action Items

1. Bowser Morner to provide cost information to Steve, once quotes are in.
2. Request to move next week's meeting to the afternoon of the 22nd; Beach will arrange for this.

Thank you for attending and being prepared. Please let me know if these minutes contain inaccuracies or misstatements.

Meeting Minutes
Valley Asphalt Site, Moraine, Ohio
(South Dayton Dump & Landfill)

Meeting Date: May 22, 2013 Meeting Time: 1:00 pm – 1:19 pm

Attendees: ☐ Arp, Jeff (BMI) ☒ Sherrard, John (Dynamac)
☒ Crago, Dan (Valley) ☒ Renninger, Steve (USEPA, Region 5)
☒ Patterson, Leslie (USEPA, Region 5)
☒ Marshall, Laura (OEPA, SWDO)
☐ Guest: Heck, Kelly (Valley)

Facilitator: ☒ Katherine Beach, Bowser Morner, Inc. (BMI)

Discussions

1. Work Plan-

- a. Conditional Approval for the VI Mitigation Work Plan issued by USEPA yesterday.
- b. Approval is conditional on submittal of a final copy of the approved Work Plan within seven business day (May 30, 2013).
- c. Distribution of final Work Plans as follows:
 - i. One hard copy and three CD-ROM copies to Renninger
 - ii. One CD-ROM copy to Patterson
 - iii. One CD-ROM copy to Marshall
- d. Discussion regarding Valley request to test samples for less than the full TO-15 spectrum. There currently is no data to suggest that the COCs migrating upward are static; full TO-15 testing will need to be conducted. If, in the future, analytical shows a trend that COCs migrating upward have stabilized, EPA may, at that time, consider reducing the number of TO-15 analytes to be tested.
- e. Typo in Section 7 (reference to ASAO) identified; will be changed to UAO.

Steve requested that a new section be added to the standard (weekly teleconference meeting) agenda. It was agreed that we will discuss the major milestones, their status and deadlines each week. We then reviewed the Project Schedule, as follows:

1. Submit Final Work Plan no later than 5/30/13 (BMI)
2. Initiate Section 4 (of the Work Plan) tasks no later than 5/28/13 (BMI)(first Section 4 task is to conduct inspections; that is scheduled for tomorrow)(BMI)
3. Obtain quotes from mitigation system installers no later than 5/30/13 (BMI).
4. Select mitigation system installers no later than 6/6/13 (Valley)
5. Receive design for systems no later than 6/13/13 (BMI)
6. Install SS probes in all buildings no later than 6/18/13 (BMI)
7. Submit Monthly Status Reports (BMI)
8. Install SSDS no later than 7/11/13 (BMI)

9. Demolition completed no later than 7/31/13 (Valley)

- *[Note – this was not discussed in detail during our call, but on further consideration, I thought would be helpful for others to know that: Contractors will be on-site tomorrow and will provide a quote by May 30. They may include their designs with the quote or by June 13. I plan to talk to each contractor tomorrow and get their initial plans at that time.]
- Three or four contractors will be on-site tomorrow. They are:
- A-Z Solutions, The Environmental Doctor, Geiler Company and Radon Systems.
- Our proposal specification package included a requirement to have each mitigation contractor provide a sketch of the system in their design, including the extraction and radius of influence points.

2. Mitigation Database Summary Review-

- a. Demolition tentatively planned for 3 or 4 structures:
 - i. Building 1
 - ii. Building 2 front (office) portion of the building.
 - iii. Building 7 (ownership of building verified to be Jack Boesch, who has given verbal authorization to demolish it)
 - iv. Building MP
- b. Demolition schedule is dependant on asbestos and lead survey results, which are expected in-hand by this Friday or next Monday.
- c. Steve asked where the C&DD rubble will go. Vance Road Landfill is a licensed C&DD debris and is located within a few miles of the Valley site. Stoney Hollow landfill, located adjacent to Vance Road Landfill, is licensed to take asbestos. These are the likely disposal facilities for the demo debris.
- d. Mitigation is planned for 3 structures:
 - i. Building 2 (back portion)
 - ii. Building 4
 - iii. Building 5
- e. Steve inquired whether Valley was still considering the installation of intrinsically safe mitigation systems in all buildings. To offer Valley better data, we are requiring the mitigation contractors to provide the cost of intrinsically-safe replacement parts (for systems to be installed in Buildings 4 and 5). Valley and take those costs into consideration after reviewing the quotes.
- f. Steve requested that as details regarding the mitigation become available (ie: number of extraction points, etc.), they be included in the Mitigation Summary Database.

Action Items

1. Valley to submit final Work Plan to EPA. Due May 30, 2013.
2. Beach to include Project Schedule Update to Agenda (done).

Thank you for attending and being prepared. Please let me know if these minutes contain inaccuracies or misstatements.

APPENDIX H

OM&M PLAN FORMS

**ATTACHMENT H1 – BUILDING PHYSICAL SURVEY
QUESTIONNAIRE**

ATTACHMENT H2 – INSPECTION CHECKLIST

ATTACHMENT H3 – REPAIR LOG

FORM 1: BUILDING PHYSICAL SURVEY QUESTIONNAIRE

Date: _____ Time: _____ Inspector: _____

Address: _____ Site Layout: Parcel Number: _____ Building : _____

Building Owner: _____

Occupant Name: _____

Contact Name: _____

Phone Number: _____

Time resident/employed in home/building? _____

Occupation: _____

Number and Age of Occupants: Adults: _____

Children: _____

BUILDING TYPE: One-Story _____ Two-Story _____ Multi-Story _____ Brick _____ Siding _____ Stucco _____
(Circle One) Residential / Industrial / Commercial / Multi-use / Other (specify) _____

If residential, what type (circle): Single Family / Condo / Multi-family / Other (specify) _____

If multiple units, how many? _____

If commercial, what is the business? _____ Hours of Occupation/Occupancy? _____

Does the commercial property include residences (i.e., multi-use)? Y N

If yes, how many? _____

DESCRIBE BUILDING: _____ **YEAR CONSTRUCTED:** _____

Is the building insulated? Y / N How air tight? Tight / Average / Not Tight

Previous Uses: _____

WEATHER SEALS: General Condition: Good _____ Fair _____ Poor _____ Not Present _____

Are doors/windows kept open to allow for outdoor-to-indoor air exchange? _____

BASEMENT/ BOTTOM FLOOR	None	<input type="checkbox"/> Finished	Unfinished	Depth below reference point (meters)	Floor covering
Partial	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
Full	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
Crawl Space	<input type="checkbox"/>	N/A	N/A	_____	_____
Slab-on-grade	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____

Is the bottom floor used as a living/work space area? (circle) Y / N

Number of floors at or above grade: _____

Depth of basement below grade: _____ ft. Basement Size: _____ ft²

FORM 1: BUILDING PHYSICAL SURVEY QUESTIONNAIRE

Foundation construction: Poured concrete ☐ Concrete block ☐ Cinder block ☐ Stone ☐

Walls: Poured ☐ Block ☐ Stone ☐ Other: _____

Walls: Unsealed ☐ Sealed ☐ Sealed with _____

Integrity walls: Good ☐ Fair ☐ Poor ☐

The bottom floor is: Wet ☐ Damp ☐ Dry ☐ Moldy ☐

Any visual evidence of leakage through bottom floor walls or floor Yes ☐ No ☐

Floor Construction: Poured concrete ☐ Wood ☐ Earth ☐ Brick ☐ Other: _____

Floor condition (cracks, drains): _____

Condition at floor / wall joint (if visible): _____

Any exterior openings from the bottom floor:

☐ Vents ☐ Fans ☐ Windows
☐ Wall openings ☐ Utility pipe penetrations ☐ Other: _____

Type of ground cover outside of building: grass / concrete / asphalt / other (specify): _____

Sub-slab vapor / moisture barrier in place? Yes / No / Don't know Type of barrier: _____

RADON SYSTEM: ☐ Yes ☐ No Is the system active or passive? Active / Passive

Do you have sump?: Yes ☐ No ☐ Where: _____ (show on figure)

If yes, sealed ☐ open ☐ NA ☐ If yes, is there water in the sump?: Yes ☐ No ☐

Have there ever been a fire in the building?: Yes ☐ No ☐

If yes, describe its location and extent : _____

Is there a laundry room located inside the house/building?: Yes ☐ No ☐

If yes, describe its location: _____

WATER AND SEWAGE

Is this building serviced with municipal water? Yes ☐ No ☐

Water well present?: Yes ☐ No ☐ Don't know ☐ Is well used for drinking water? Yes ☐ No ☐

Well location: _____ (show on figure) What do you use the well for?: _____

Do you have a cistern?: Yes ☐ No ☐ Don't know ☐

If yes, describe its location: _____

Do you have septic system?: Yes ☐ No ☐

If yes, describe its location: _____ (show on figure)

If yes, describe how septic system is cleaned: _____

GARAGE: Is there an attached garage? ☐ Yes ☐ No Describe: _____

FORM 1: BUILDING PHYSICAL SURVEY QUESTIONNAIRE

HEATING, VENTILLATION, AND AIR CONDITONING

Type of heating system(s) used (circle all that apply, note primary)

Hot air circulation	<input type="checkbox"/>	Heat pump	<input type="checkbox"/>	Hot water baseboard	<input type="checkbox"/>
Space heaters	<input type="checkbox"/>	Stream radiation	<input type="checkbox"/>	Radiant floor	<input type="checkbox"/>
Electric baseboard	<input type="checkbox"/>	Wood stove	<input type="checkbox"/>	Outdoor wood boiler	<input type="checkbox"/>

FURNACE: Location: _____

Type: Gas	<input type="checkbox"/>	Forced air	<input type="checkbox"/>	Wood	<input type="checkbox"/>
Oil	<input type="checkbox"/>	Hot water	<input type="checkbox"/>	Propane	<input type="checkbox"/>
Electric	<input type="checkbox"/>	Coal	<input type="checkbox"/>	Other: _____	

Does furnace have outside combustion air vent? _____

Do you have a fireplace? Yes ☐ No ☐ Does fireplace have an outside combustion air vent? Yes ☐ No ☐

Do you use kerosene space heaters? Yes ☐ No ☐

AIR CONDITONER: None ☐ Central ☐ Window units ☐

(If yes, which rooms and capacities?) _____

SPILL/CONTAMINANT SOURCE INFORMATION

Visual evidence of spills/releases: _____

Type of petroleum/VOC release? _____

When did the release occur? _____

What areas of the building have been impacted by the release? _____

Are there any odors? ☐ Yes ☐ No If yes, describe the odors: _____

Where are the release-related odors found? _____

Photo Direction

Subject

FORM 1: BUILDING PHYSICAL SURVEY QUESTIONNAIRE

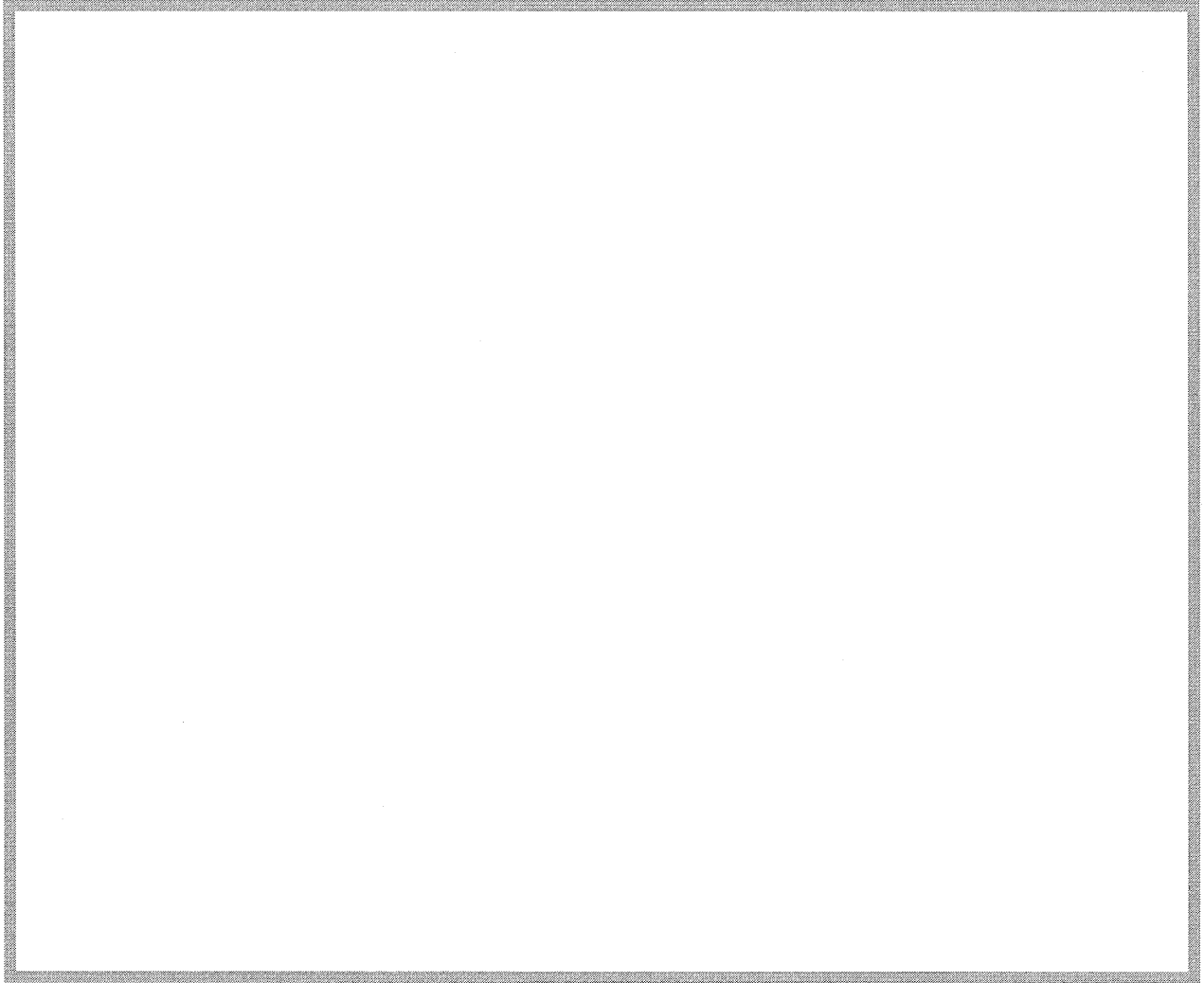
Building Layout:

Parcel Number _____; Building _____

Mark the following on the below Figure: Additions or Modifications; door / windows / loading docks kept open for air exchange; building compartmentalization, including size and locations of compartments.

PARID:

PARCEL LOCATION:



A

Sub-Slab Depressurization System Annual O&M Inspection Form

Property Address: 1901 or 1903 Dryden Road,
Moraine, Ohio

Temperature (Ambient) F

Owner's Name: Valley Asphalt

Temperature (Building) F

Building Designation: ☐ 2 ☐ 4 ☐ 5

Barometric Pressure "Hg

Inspector Name:

Weather Conditions:

Date:

Time:

Exterior System Inspection

Is fan intact and operating? Yes No

Any unusual fan vibrations? Yes No

Is vent piping/downspout intact? Yes No

Any caulking required around fan and piping connections? Yes No

Interior System Inspection

Any heaving or subsidence at suction point? Yes No

Any whistling noises noted? Yes No

Caulk seals inspected? Yes No

Cracking or Separation of piping joints? Yes No

Notes of Inspection Results:

Measurements

System Manometer Reading		" H ₂ O
Vacuum Point #1		" H ₂ O
Vacuum Point #2		" H ₂ O
Vacuum Point #3		" H ₂ O
Vacuum Point #4		" H ₂ O
Is the Manometer Steady?	Yes	No

Initial System Manometer Reading		" H ₂ O
Vacuum Point #1		" H ₂ O
Vacuum Point #2		" H ₂ O
Vacuum Point #3		" H ₂ O
Vacuum Point #4		" H ₂ O

Comments (any repairs made while visiting, etc...):

Property Address: 1901 or 1903 Dryden Road,
Moraine, Ohio

Temperature (Ambient)	F
-----------------------	---

Temperature (Building) _____ F

Barometric Pressure _____ "Hg

Weather Conditions:

[illegible]

100

Component	Inspected?		Repaired?		Replaced?	
Floor integrity (no new cracks)	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A	
Seal of PVC at floor	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
PVD discharge pipe run (include joints)	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Seal of PVC pipe run through exterior wall	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Seal of PVC pipe run through fan	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Electrical components from fan to box	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
PVC discharge pipe above roof	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Probe	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Probe Cement/Seal	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No

Comments (any repairs made while fishing, etc.):	

APPENDIX I

QUALITY MANAGEMENT PLAN

BOWSER-MORNER
QUALITY MANAGEMENT SYSTEM MANUAL
QA-040
CIVIL AND GEOTECHNICAL ENGINEERING
AND SUBSURFACE EXPLORATION SERVICES

Corporate Offices and Laboratories
4518 Taylorsville Road
Dayton, Ohio 45424
(937) 236-8805

Lexington Offices and Laboratories
2416-B Over Drive
Lexington, Kentucky 40511
(859) 233-0250

Springfield Offices and Laboratories
226 W. Highland Street
Springfield, IL 62704
(217) 544-8378

Toledo Offices and Laboratories
1419 Miami Street
Toledo, Ohio 43605
(419) 691-4800

Cincinnati Offices and Laboratories
1220 Hillsmith Drive, Suite K
Cincinnati, OH 45215
(513) 771-0254

Birmingham Offices and Laboratories
3016 Commerce Square South
Irondale, AL 35210
(205) 999-7792

Manual No. _____

Latest Revision 2

**BOWSER-MORNER
QUALITY MANAGEMENT SYSTEM MANUAL**

QA-040

**CIVIL AND GEOTECHNICAL ENGINEERING
AND SUBSURFACE EXPLORATION SERVICES**

CONFIDENTIAL

This Quality Management System Manual has been produced for use by Bowser-Morner to guide and demonstrate its capability and quality in the fields of engineering and technical field services. It is primarily intended for internal use, and should be used externally only where necessary for qualification purposes.

Information contained herein is considered to be confidential to Bowser-Morner and is not permitted to be reproduced in any manner.

(Cut Here)

Return this section of the page to:

Quality Assurance Department
Bowser-Morner, Inc.
4518 Taylorsville Road
Dayton, Ohio 45424

This Quality Management System Manual has been produced for use by Bowser-Morner to guide and demonstrate its capability and quality in the fields of engineering and technical field services. It is primarily intended for internal use, and should be used externally only where necessary for qualification purposes.

Information contained herein is considered to be confidential to Bowser-Morner and is not permitted to be reproduced in any manner. In-house distribution and control of this manual is controlled electronically. Controlled distribution outside Bowser-Morner is by hardcopy.

I have read, and agree to abide with, the confidential statement printed above.

Signed _____

Title _____

Agency (Company) _____

Date _____ Revision: 2

No. _____

**BOWSER-MORNER
QUALITY MANAGEMENT SYSTEM MANUAL**

QA-040

**CIVIL AND GEOTECHNICAL ENGINEERING
AND SUBSURFACE EXPLORATION SERVICES**

APPROVALS

Steven M. Bowser, Company President

Date

Mark A. Bingman, Quality Assurance Manager

Date

**BOWSER-MORNER
QUALITY MANAGEMENT SYSTEM MANUAL**

QA-040

**CIVIL AND GEOTECHNICAL ENGINEERING
AND SUBSURFACE EXPLORATION SERVICES**

REVISIONS

The following is a listing of revisions made to this Quality Management System Manual.
Current revision changes are highlighted in red.

<u>Action Taken</u>		<u>Date</u>
Established		10/96
Revision No. 1	Format change to ISO 9001:2000 Addition of subsurface services	12/01
Revision No. 1(08)	Editorial changes	05-08
Revision No. 2	Remove References to Bowser-Morner Associates Add to CAR and PAR procedures Changes to Position Responsibilities Add Job Descriptions and Signatory requirements Changes to requirements for in-house SOPs	02-13

**BOWSER-MORNER
QUALITY MANAGEMENT SYSTEM MANUAL**

QA-040

**CIVIL AND GEOTECHNICAL ENGINEERING
AND SUBSURFACE EXPLORATION SERVICES**

PRESIDENT'S LETTER

Subject: Quality Management System

From: Steven M. Bowser

To: Company Employees

This Quality Management System Manual has been developed for your guidance in carrying out quality civil and geotechnical engineering and field services at Bowser-Morner. We urge that you become familiar with all the sections in this manual that apply to your work and activities, and that you refer to this manual as new aspects develop.

It is our firm policy that management and senior level engineers are responsible for the quality and review of work of those reporting to them.

Thus, ultimately, the department managers and chief geotechnical engineer are responsible for the quality of our services and we assure you that we take this responsibility very seriously. On the other hand, due to the diversified nature of Bowser-Morner's services, each individual employee must accept substantial responsibility for their own work.

For this reason, this manual is accessible electronically so that you can be familiar with the procedures and practices of quality assurance in the company. As with Bowser-Morner's quality management system, this manual is a "living" document and will be periodically updated as existing policies and procedures are revised and as new policies are developed.

Steven M. Bowser

President

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INTRODUCTION

Bowser-Morner's Mission

Bowser-Morner's mission is to provide quality professional services that meet or exceed our customers' needs in laboratory testing, field services, subsurface exploration, and engineering/scientific expertise.

We are dedicated to professional ethics, value to our customers, and support of the public welfare. We believe that continued, measured growth is in the best interest of our customers, owners, and dedicated employees.

Description of Bowser-Morner

Bowser-Morner is comprised of two divisions that serve a wide range of individuals, commerce, industry, and agencies of the Government. These two divisions are Analytical Services and Engineering and Construction Services.

Analytical Services

The primary function of the Analytical Services Division is to provide customers with a reliable and impartial source for laboratory testing. Testing includes:

- General Chemistry (chemical testing of metals and alloys, limestone, petroleum, plastics, etc.)
- Special Chemistry (failure analysis and composition analysis of manufactured products and processes)
- Product Testing and Vibration (simulated environmental testing of commercial products and components)
- Mechanical and Metallurgical (tensile strength, hardness, impact, weld testing and evaluation, etc.)
- Calibration (dimensional, mechanical, thermodynamics, time and frequency, electrical, and radon devices)

Engineering and Construction Services

The Engineering and Construction Services Division provides a wide variety of construction-related services that include:

- Civil Engineering (engineering in the areas of grading and drainage, dams and embankments, mine reclamation, etc.)
- Geotechnical Engineering (soil studies for foundations under buildings, bridges, roadways, towers, large-span pipes, airport runways, etc.)
- Subsurface Exploration (exploration and sampling for geotechnical, environmental, mineral and aggregate reserves)
- Field Services (construction observation and QA/QC testing at construction sites)
- Laboratory Materials Testing (soil, rock, aggregate, concrete, asphalt, and other construction materials)

Brief History of Bowser-Morner

The Laboratory, founded in 1911 as the Kurz Chemical Laboratories, was purchased by R. R. Bowser and A. L. Morner in 1925. Until that time, the Laboratory offered chemical analysis exclusively. Soon after the acquisition, Bowser-Morner ventured into the field of construction materials testing.

From early in the 1930's until 1963, the main facilities and corporate offices were maintained near the downtown area of Dayton Ohio; then, due primarily to construction of an interstate highway, the offices and laboratories were relocated to the eastern sector of Dayton.

In 1937, Bowser-Morner became a charter member of the American Council of Commercial Laboratories, which later became the American Council of Independent Laboratories (ACIL).

In the 1950's, the company was organized into two divisions (Analytical and Construction) with separate departments. This permitted greater flexibility for the company's overall capabilities and allowed specialization into certain fields of services and types of materials.

In 1968, Bowser-Morner acquired Dayrad Testing Laboratories which permitted expansion into other fields of the physical sciences, specifically electronics and calibration.

The Dayton based company acquired Interstate Testing and Drilling of Toledo Ohio in February 1974 and changed the name to Bowser-Morner, Inc. - Toledo district. Also in 1974, a district office in Maysville Kentucky was opened.

In June 1982, a district office was established in Lexington Kentucky to better serve the area south of the Ohio River. The Lexington office essentially replaced the Maysville district office, which closed in March 1983. The Lexington district offered primarily engineering and field services along with a geotechnical laboratory.

In 1986, the Analytical Services and CMT laboratories and field services were ISO/IEC 17025 accredited by the American Association for Laboratory Accreditation (A2LA).

In October 1989, the main laboratory facilities and corporate offices were again relocated to a new facility in a northern suburb of Dayton Ohio. This 56,000 square foot, modern facility enabled Bowser-Morner to continually enhance its capabilities.

In 1995, the Dayton Ohio CMT field and laboratory services were accredited by AASHTO and in 1996 the Toledo Ohio CMT field and laboratory services became AASHTO accredited.

Of major significance was the purchase of Bowser-Morner's first sonic exploration rig in 1997. This relatively new technology allowed for continuous samples with close to 100 percent recovery. Three additional sonic rigs were added in 1999 and 2000.

In 1998, the Toledo office teamed up with the city to reclaim a portion of Toledo's old CSX railroad terminal site. As a result of this effort, in November of 1998, the Toledo staff moved into a new 14, 000 square foot facility located on the reclaimed Brownfields property.

In November 2000, Dayton's CMT field and laboratory services became AASHTO's first accreditation to the international standard ISO/IEC 17025 – in June 2002, Toledo became the second AASHTO ISO/IEC 17025 accredited field and CMT laboratory.

In 2003, the company's growing services in laboratory testing was expanded by opening a construction materials testing laboratory in Springfield Illinois. This laboratory was AASHTO R18 accredited in December 2009 and ISO/IEC 17025 accredited in May 2012.

In 2008, a regional office for field and laboratory services was established in Cincinnati Ohio to better serve clients along the I-75 corridor in Ohio and Kentucky and in September 2012 a regional office and CMT laboratory was established in Birmingham Alabama.

SECTION 1 – SCOPE of Manual

1.1 Objective

Bowser-Morner has an established and actively maintained quality management system appropriate to the type, range and volume of engineering, sampling, testing, observation, and research activities it undertakes. This quality management system is composed of several documented programs that individually address the various activities within Bowser-Morner's organization. The objective of this manual (QA-040) is to describe Bowser-Morner's quality management system for civil and geotechnical engineering and subsurface exploration services. A program that addresses the quality management system for field and laboratory testing and equipment calibration services provided by Bowser-Morner has been documented in a separate manual, QA-020.

1.2 Approach

ISO 9001:2008, *Quality Management Systems - Requirements*, has been adopted as the format and foundation for Bowser-Morner's quality management system manual QA-040.

1.3 Application of the Quality System Manual

This quality management system manual outlines and describes the procedures for establishing and maintaining quality engineering, design, and subsurface exploration services at Bowser-Morner. The control of quality is a continuing process; consequently, this manual provides not only for the formation of a quality management system, but also for its continuation through communication, standardization, documentation, and review programs. The following operational departments comply with the applicable requirements of this manual.

Engineering Services

The Engineering services provided by Bowser-Morner include geotechnical and civil engineering, and hydrogeology. Many of our engineers are licensed to practice engineering in states throughout the eastern United States. Among the many types of consulting engineering services provided are shallow, deep, and special foundation designs, dam designs, solid waste landfill designs and permitting, inspections and remediations, grading-drainage plans and designs, shoreline protection designs, and pavements. Other services include hydrogeological evaluations, solid waste coal mining reclamation, slope stability studies, and mine subsidence investigations.

Geo-Environmental Consulting

Bowser-Morner provides a range of Geo-Environmental Consulting services to various types of industries, individuals, real estate firms, attorneys, government agencies, lending institutions, universities, and hospitals. Services include environmental assessments of business, commercial, and industrial properties, remedial investigations and feasibility studies, clean-up plans for hazardous waste sites, SPCC and hazardous waste management plans, monitoring of remediation and demolition, groundwater and soil studies, closure of underground storage tanks, wetland/ecological studies, and more. Our geo-environmental team works closely with our subsurface exploration, and geotechnical personnel.

Subsurface Exploration

Bowser-Morner's Subsurface Exploration department has been providing exploration services to industries and government agencies throughout the eastern United States for the past 70-plus years. Equipment includes truck-mounted, track-mounted, and ATV mounted rigs for hollow-stem auger, rotary, and sonic boring methods. Services include installation of monitoring wells, AS/SVE wells, recovery wells, and aquifer test pump wells. In addition, the subsurface exploration department performs borings for geotechnical studies, sampling studies to analyze reserves of aggregate and stone producers, and environmental sampling.

Additional Resources

The following departments and internal functions support the engineering and subsurface operations:

Drafting and AutoCad including computer graphics and software available to support engineering work such as AutoCad, SurvCad, MicroStation, foundation analyses, and hydrology programs.

Field and Laboratory Services including field observations-testing and laboratory testing for geotechnical and construction materials test methods.

Administration including mailing operations, (both incoming and distribution), telephone switchboard operations, benefits, health and safety, and human resources.

Accounting is responsible for accounts receivable, accounts payable, payroll, and the preparation of financial management reports.

Facilities and Maintenance provides building and equipment maintenance and repair and environmental controls.

Marketing provides planning, advertising, public relations, and sales effort to promote the continued growth of Bowser-Morner.

Management Information System provides hardware and software solutions and support. Systems include a central server system and a network of PC's.

Quality Assurance provides development, distribution, and support for control of internal documents, auditing, nonconformance investigations, corrective and preventive actions, measurement of customer satisfaction, management review.

1.4 Quality Management System Compliance

Bowser-Morner's quality management system is in substantial compliance with the applicable sections and requirements of international, national, and industry recognized standards including: ISO 9001:2008, 10 CFR 830-120, DOE O 414.1, ASFE Guide to Quality, ASTM D 3740, and others. Appendix C of this manual cross-references in more detail, Bowser-Morner's quality management system to several of these standards.

SECTION 2 – NORMATIVE REFERENCES

The following normative documents contain provisions, which through their specified requirements and/or reference in this text, constitute provisions of this quality management system manual. Copies of these and other quality related documents are on file and available for reference in the quality assurance department.

- ISO 9001:2008, *Quality Management Systems - Requirements*
- 10 CFR 830.120, *Quality Assurance*
- DOE O 414.1, *Quality Assurance*
- ASFE, *Guide to Establishing Quality Control Policies and Procedures for Engineering Firms Practicing in the Geosciences*
- ASTM D 3740, *Practice for Evaluation of Agencies Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction*
- ANSI Z540-1, *Calibration Laboratories and Measuring Equipment – General Requirements*

SECTION 3 – TERMS AND DEFINITIONS

For the purpose of this quality management system manual (QA-040), the following relevant terms and definitions relating to quality apply. Most terms and definitions have been derived from ISO 9000:2000, *Quality Management Systems – Fundamentals and Vocabulary*.

Acceptance Criteria. Specified limits, typically upper and lower, placed on characteristics of an item, process, or service.

Audit. A planned and documented activity performed to determine by investigation, examination, and evaluation of objective evidence, the adequacy and compliance with established policies and procedures.

Calibration. The set of operations, which establish under specified conditions, the relationship between values indicated by a measuring instrument or measuring system, or values represented by a material measure, and the corresponding known value of a measurand.

Condition Adverse to Quality. An all-inclusive term used in reference to any of the following: failures, malfunctions, deficiencies, defects, and nonconformance. A significant condition that if uncorrected, could have a serious effect on the safety and/or quality of the company operations.

External Audit. An audit of those portions of another organization's quality system not under the direct control of Bowser-Morner (also see Peer Review).

Internal Audit. An audit of those portions of Bowser-Morner's quality system requirements as documented in the quality management system manual QA-040.

Item. An all-inclusive term used to indicate any of the following: sample, specimen, equipment, material, part, unit.

Nonconformance. A deficiency in characteristic, documentation, or procedure that renders the quality of a service or activity unacceptable or indeterminate.

Observation. The act of recognizing and documenting a fact or occurrence often involving a measurement or visual comparison to a specified requirement.

Procedure. A document that specifies or describes how an activity is to be performed.

Quality Assurance (QA). Those planned and systematic actions necessary to provide adequate confidence in the accuracy of engineering designs, recommendations and opinions, subsurface investigations, or other services (i.e. documenting policies and procedures, training personnel, auditing operations, controlling purchasing, etc.).

Quality Control (QC). Those activities and functions that are integrated into routine engineering and field activities and procedures to provide adequate confidence in the accuracy of data, results, or services (report peer review, reference reviews, calculation checks, equipment calibration, etc.).

Quality Manual. A document or set of documents that describe the company's quality policy, quality system, and quality practices (quality assurance and quality control).

Quality Management System. The organizational structure, responsibilities, procedures, processes and resources for implementing quality management.

Subcontractor. A company that supplies products and/or services through direct interaction with Bowser-Morner (typically includes the use of a written contract).

Traceability. The ability to trace the history, application or location of an item with relation to time, place, personnel, and performance. For Bowser-Morner, traceability becomes an issue with sample collection and handling, and equipment calibration.

Validation. The act of confirmation through review and/or simulation that services conform to a specified method or procedure, if known.

Verification. The act of reviewing, inspecting, testing, checking, auditing, or otherwise determining and documenting whether items and processes conform to specified requirements.

SECTION 4 – QUALITY MANAGEMENT SYSTEM

4.1 General Requirements

Bowser-Morner's quality management system is composed of several programs that individually address the various activities within the company. Personnel are to be familiar with and implement these policies and procedures as they apply to their activities.

The purpose and function of the quality management system is to present a standard of *Good Quality Practices (GQP)* whereby an independent engineering, exploration, and testing firm can assure quality and determine its reliability in performing engineering designs, observations, explorations, sampling, testing, and consultation.

4.1.1 Quality Management System

The quality management system shall identify, establish, document, communicate, and implement quality policies and programs to:

- a) Establish and maintain this document (*QA-040*) and other related standard operating procedures that define the company's quality policy and quality management system.
- b) Develop, control, and distribute documents and procedures as defined in this manual.
- c) Establish policies and procedures for maintaining effective and open communications with employees.
- d) Develop strategic planning that clearly identifies the company's goals and communicates them at appropriate levels of responsibility.
- e) Establish a formal organizational structure with defined lines of authority that identify responsibilities and reporting relationships.
- f) Monitor by means of scheduled reviews and internal audits, the adherence to, and effectiveness of, the policies and procedures established within the quality management system.
- g) Implement training programs and other development opportunities for personnel that emphasize the importance of professional development, on-the-job training, and evaluation of employee competency.
- h) Provide appropriate work environment, equipment, and support services that promote honesty and objectivity and discourage conflict and other pressures that might adversely affect the quality of work.
- i) Effectively communicate with the customer to determine their needs, contractual requirements, and feedback.
- j) Establish project management policies and procedures for customer input, design and service processes, and the review and approval of designs, drawings, specifications, calculations, test data, and reports that are consistent with the company's and the customer's needs and with professional ethics.

- k) Qualify suppliers and control the purchase of equipment, supplies, and services to the extent necessary to ensure a quality service to our customers.
- l) Monitor, measure, plan, and implement actions for the improvement of the company's quality management system and the services provided to our customers.
- m) Identify and review nonconformities (including customer complaints), determine the cause(s), evaluate the need for corrective action, and implement any action judged to be needed.
- n) Determine action(s) to lessen the causes of potential nonconformities in order to help prevent their occurrence.

4.1.2 Managing the Quality Management System

The quality policies and programs are to be managed by Bowser-Morner's management team (department managers and above) in accordance with the requirements of this documented quality management system (*QA-040*).

The quality management system manual (*Section 4.2.*) and supporting documents are to be reviewed annually by the quality assurance manager for adequacy and needed changes.

4.1.3 Subcontracting Services

Approved Subcontractors

Subcontractor sources for field support services, laboratory testing, purchased supplies, and consumables are audited on a scheduled basis for compliance with applicable quality system requirements, codes, and regulations.

The competency of the subcontractor is approved through the quality assurance department via one or more of the following methods:

- History of performance
- On-site audit
- Audit by survey questionnaire
- Independent accreditation, certification, or licensing

Audits are conducted when practicable using a questionnaire submitted to the subcontractor. This questionnaire may be supplemented by an on-site audit at the quality assurance manager's discretion.

A list of approved subcontractors detailing the services provided and the method(s) of approval is maintained by the quality assurance manager and is available in a public services folder located on the company's server (*BMI_Public – QA Services*).

Refer to Bowser-Morner Quality Assurance SOP QA-0710 for more details concerning the selection of subcontractors.

Notification to the Customer

Notifying the customer that Bowser-Morner intends to subcontract work may typically be good practice, but it is not always a requirement. The department manager should use his or her judgement concerning notifying the customer that a portion of the scope of work is scheduled to be subcontracted. This same judgement should be applied to the identification of subcontracted test results on a Bowser-Morner report.

4.1.4 Departure from Policies and Procedures

Exceptional departure from the quality management system policies and procedures documented in this manual (*QA-040*) requires approval by upper management. A written request including an explanation of the departure should be submitted for approval by a department manager or above. A copy of the written request is to be supplied to the quality assurance manager.

4.1.5 Additional Information

The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner SOP QA-0210, *Quality System Structure – Engineering and Subsurface Operations*
- Bowser-Morner SOP QA-0710, *Use of Approved Subcontractors*

4.2 Documentation Requirements

Bowser-Morner's quality management system is documented by the following:

4.2.1 General

Quality at Bowser-Morner

At Bowser-Morner we define quality as meeting or exceeding the requirements of those we serve - our customers, regulatory bodies, industry standards, and each other. A policy has been written to document and express the company's commitment to and framework for producing a quality service. This quality policy is documented in *Section 5.3* of this quality management system manual.

Key Quality Objectives

The core of Bowser-Morner's corporate mission is to provide quality professional services that meet or exceed our customer's expectations. To help in achieving our mission, Bowser-Morner has adopted the following *measurable* key quality objectives that gauge (*Section 5.4.1*) our progress in this quality journey.

The Key Quality Objectives are to:

- a) Maintain a quality system manual and set of standard operating procedures that accurately define the company's quality management system.
- b) Maintain a system of document control that allows for document identification, retrieval, and review to ensure that the current revision is available to employees.
- c) Maintain procedures and facilities for the documenting, secure storage, retrieval, and destruction of work files and records.
- d) Provide manuals, standard operating procedures, and training to management and supervisory personnel as needed to effectively communicate the requirements of the company's quality management system.
- e) Complete an annual plan for marketing, sales, revenue, and resources, which provides for the orderly development and financial stability of our company.
- f) Maintain an organizational chart and position descriptions that define the structure, authority, and responsibilities of management.
- g) Complete and distribute to management an annual report that reviews and summarizes the effectiveness of the company's quality management system and identifies areas for improvement.

- h) Select and maintain a staff of professionals and support personnel, who are technically qualified to perform the scope of services offered to our customers.
- i) Establish guidelines and requirements for professional development and provide training programs and other development opportunities that meet our staffing needs.
- j) Provide appropriate personnel, equipment, and facilities, which allow accurate and timely response to customer requirements.
- k) Maintain software programs, report and file formats, and verify the scope of application and accuracy of drawings, standards, programs, and procedures.
- l) Maintain an inventory listing of calibratable equipment and verify the equipment receives calibration and adequate maintenance on a scheduled basis.
- m) Define the customer's requirements and expectations in a documented scope of work that is part of an agreed to contract.
- n) Promptly address and resolve any customer complaints.
- o) Establish project management policies and procedures that are consistent with both the company and the customer's needs and with professional ethics.
- p) Establish and maintain a comprehensive internal quality control program including supervision of employees' work and review of technical data, calculations, drawings, specifications, and reports.
- q) Maintain a list of approved sources for subcontracting and make it available to management and purchasing personnel.
- r) Successfully complete regular internal audits and reviews and implement necessary corrective actions.

4.2.2 Quality System Manual

Bowser-Morner has established and maintains this quality management system manual (*QA-040*) to document the scope, policies, procedures, and interactions of its quality management system and quality related standard operating procedures. This manual is to be reviewed annually and periodically revised by the quality assurance manager, to incorporate any accumulated revisions and/or additions.

4.2.3 Control of Documents

The purpose of document control is to provide procedures for the identification, organization, maintenance, and distribution of technical and non technical documents. It is the responsibility of the quality assurance manager to see that these procedures exist throughout the company.

For identification purposes, documents are divided into two groups: *published documents* and *in-house documents*. Published documents such as technical standards are simply identified by their published identification number and title. Examples are the Ohio Building Code OBC, American Concrete Institute ACI Building Code, and ASTM standards.

In-house documents are divided into four (4) major categories. These are: 1) quality system documents, 2) calibration procedures, 3) technical field and laboratory procedures, and 4) non-technical operating procedures.

In-house developed documents are given an identification number and title. Quality system documents and calibration procedures are identified with alpha characters and numbers. Technical and non-technical engineering and field procedures are identified by a numerical system. Examples of these identifications are:

- | | |
|---------------------------|-----------------------|
| • Quality System Document | Control No. - QA-xxx |
| • Calibration Procedure | Control No. - BM-xxxx |
| • Technical Procedure | Control No. - 50-xxx |
| • Non-Technical Procedure | Control No. - 900-xxx |

This quality management system manual represents one such document identified by the control number QA-040. The quality assurance manager maintains a listing of controlled documents. This list is also available to department managers and technical staff in a public services folder located on the company's server (*BMI_Public – QA Services*).

In-house Document Approval and Distribution

The quality assurance manager writes most quality system documents. The quality assurance manager and/or a department manager may write calibration procedures. A department manager or a knowledgeable engineer/scientist typically writes technical and non-technical procedures.

Quality system manuals (including this manual) and quality system standard operating procedures (SOPs) are approved and signed by the company president and the quality assurance manager. Other quality assurance and quality control documents must receive the approval signature of a department manager, or above, and the quality assurance manager.

Technical and non-technical procedures for engineering and design operations are approved and signed by a department manager, or above.

Technical and non-technical procedures for field operations are approved and signed by a department manager, or above, and the quality assurance manager.

For quality system documents, the quality assurance manager is responsible for distribution control. For calibration and departmental procedures (*both technical and non-technical*), distribution control is the responsibility of the department manager who may delegate control back to the quality assurance manager.

The quality assurance manager maintains the original documents for all four categories. Signed originals are stored using suitable filing cabinets in the quality assurance department. Access to these files is restricted to the quality assurance manager and selected *approved* personnel.

In-house Document Changes

Documents are reviewed and revised on an *as-needed* basis with the exception of this quality system manual and quality system SOPs, which are reviewed/revised on an annual basis by the quality assurance manager.

When the review of a technical or non-technical document results in the need for revision, the necessary changes are submitted to the quality assurance manager who makes the changes to the electronic master copy and issues a “*draft*” revised copy back to the person making the revision for final review and corrections. When the revision is complete, the appropriate individual(s) (*see document approval section*) signs and dates the revised original copy. Distribution of the revised document, including the recovery of any obsolete documents, is made as soon as practical. Refer to Bowser-Morner’s quality assurance SOP QA-0230 for more details concerning document control.

Because most in-house documents are widely distributed by electronic means, hand written revisions on printed copies are not typically allowed except as approved by the quality assurance manager. Changes may, however, be issuing as only a revised page or pages. The quality assurance manager controls the distribution of these changes.

Invalid and Obsolete Documents

Invalid and obsolete documents (*both published and in-house*) are to be removed from use as soon as practical. Published documents are typically identified with a sticker stating “*To Be Used For **Reference Only***”, or some other means of identification. Copies of these documents may be maintained in designated areas such as department reference centers.

Invalid and obsolete in-house documents are removed from use per the distribution list maintained by the quality assurance manager. The original document, which is maintained by the quality assurance manager, is retained for a period of time as defined in the following section.

4.2.4 Control of Records

Bowser-Morner maintains a records system to suit the various engineering and subsurface disciplines of the company. Records are to be legible, identifiable, retrievable, and protected against damage, deterioration, or loss. Most records are identified and filed by customer name or Bowser-Morner project number, year, and revision or sheet number (*in-house drawings*). The general classification and handling of records is divided into three main categories. These categories are: 1) client documents, 2) operating records, and 3) quality system records. Company financial records are controlled separately by the accounting department.

Client documents

Client documents are signed documents submitted to the customer as official records of services performed by Bowser-Morner, including but not limited to contracts, opinions, reports, results, drawings, and designs.

Operating Records

Records relating to the conduct of an investigation, exploration, calibration, or test assignment are considered as operating records. These may include without limitation, handwritten notes, logbooks, designed work sheets, field logs and notes, equipment data printouts, certificates of calibration, test methods, and any other documents that are related to the contents of a formal report.

Quality Records

Records of training, internal and external audits, licensing, corrective and preventive actions, approved subcontractors, and any other record generated as evidence and support of the quality management system are considered quality records.

Recording of Records

Field data and notes of subsurface explorations and engineering observations carried out by Bowser-Morner are to be recorded accurately, clearly, and unambiguously to ensure that the information is meaningful to other users of the records. When mistakes occur in these records, the mistake is to be crossed out (*not erased, made illegible or deleted*) and the correction entered alongside. The person making the correction is to initial and date such alterations to a record.

Storage and Retention

Retained documents and records shall be safely stored in a manner that provides tracking and recovery, held secure, and in confidence to the customer. Records may be stored in designated locations within the department or off-site through the use of a Bowser-Morner approved subcontractor for record management. Record storage, access, and retention are the responsibility of the department manager.

Client documents more than twenty (20) years old based on January 1st of the current year are authorized to be destroyed. Exceptions are design reports, plans, specifications, etc. where Bowser-Morner is the *engineer of record*. These records are to be retained indefinitely.

Operating records more than ten (10) years old based on January 1st of the current year are authorized to be destroyed.

Quality records more than ten (10) years old based on January 1st of the current year are authorized to be destroyed. Exceptions are annual reports to management, internal audits, and corrective actions. These records are to be retained indefinitely.

Bowser-Morner may choose to indefinitely retain selected records based on anticipated future needs (i.e. subsurface boring logs, geological studies, etc.) Refer to Bowser-Morner quality assurance SOP QA-1610 for more details concerning document retention and destruction.

Electronic Media

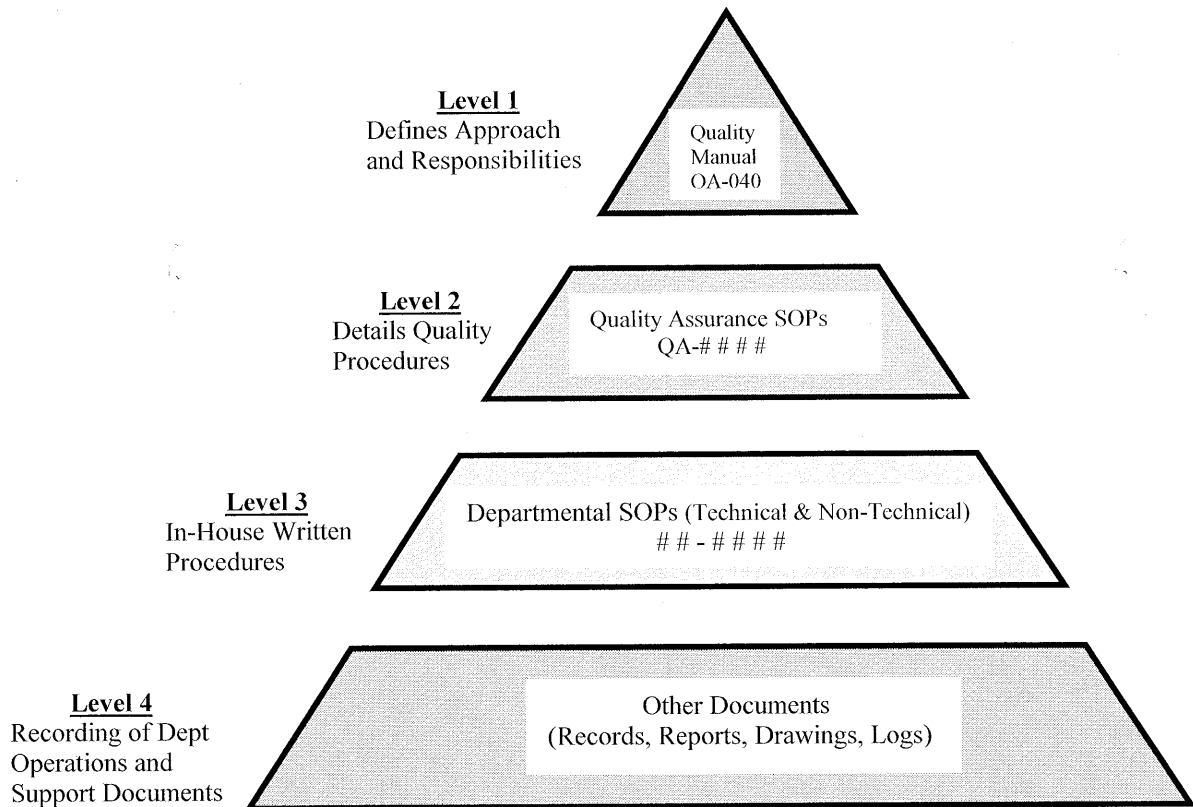
The majority of electronically stored records are engineering and subsurface reports and drawings. On a scheduled basis, these records are copied to separate removable disks. Archived computer records are placed in storage and handled in the same manner as other operating records. The handling, storage, and destruction of electronic media records are the responsibility of the information services (*IS*) department with support from the department manager. Refer to Bowser-Morner SOP 900-003 for details concerning the handling and storage of electronic media records.

4.2.5 Documentation Structure

In their *broadest* form, the policies and procedures that document Bowser-Morner's quality management system are defined in this manual (*QA-040*), authorized by the company president and quality assurance manager, and issued to management by the quality assurance manager.

In addition to the quality system manual, there are three tiers of documentation that define, in more detail, the various procedures, activities, and functions of the quality management system. Directly below the quality system manual is a set of quality assurance standard operating procedures (SOPs) that address, in specifics, the quality management system from organization through service and improvement. References to these and other SOPs are contained throughout this quality system manual.

Two other tiers complete the documentation structure. These are departmental SOPs (*field operations, subsurface exploration, and test methods*) and supporting documents (*records, reports, drawings, specifications, and many more*). The diagram below illustrates the four-tiered documentation system.



4.2.6 Additional Information

The following documents contain text that is relevant to the policies and procedures covered in this section of quality management system manual QA-040.

- Bowser-Morner SOP QA-0210, *Quality System Structure – Engineering and Subsurface Operations*
- Bowser-Morner SOP QA-0230, *Quality Assurance Program Documentation and Records*
- Bowser-Morner SOP QA-1610, *Document Retention and Destruction Program*
- Bowser-Morner SOP 900-003, *Data Archiving and Backup Strategy*
- Bowser-Morner SOP 900-020, *Off-Site Archiving of Documents*

SECTION 5 – MANAGEMENT RESPONSIBILITY

5.1 Management Commitment

Bowser-Morner's quality management system is composed of several programs that individually address the various activities within the company. Personnel are to be familiar with and implement these policies and procedures as they apply to their activities.

The purpose and function of the quality management system is to present a standard of *Good Quality Practices (GQP)* whereby an independent engineering, exploration, and testing firm can assure quality and determine its reliability in performing engineering designs, observations, investigations, testing, and consultation.

5.1.1 Commitment To

The quality management system shall document and implement quality programs to:

- a) Communicate the importance of meeting customer as well as statutory and regulatory requirements (*Section 5.2 & 5.5*).
- b) Establish a quality policy (*Section 5.3*).
- c) See that measurable key quality objectives are identified and monitored (*Section 4.2 & 5.4*).
- d) Conduct management reviews (*Section 5.6*).
- e) Ensure the availability of needed resources (*Section 6.1, 6.2, & 6.3*).

5.1.2 Legal Identification

Bowser-Morner, Inc. is legally identifiable and registered with the Secretary of State in the state of Ohio. Bowser-Morner's corporate headquarters are located in Dayton Ohio at:

Bowser-Morner, Inc.
4518 Taylorsville Road
Dayton, Ohio 45424
(937) 236-8805

Regional offices that offer engineering and subsurface services are located at:

1419 Miami Street
Toledo, Ohio 43605
(419) 691-4800

2416-B Over Drive
Lexington, Kentucky 40511
(859) 233-0250

5.1.3 Third-Party Impartiality

Bowser-Morner provides appropriate working conditions and facilities including adequate space and furnishings for its staff in an environment that promotes honesty and objectivity while discouraging conflict and other undue pressures which might adversely affect the quality of work. If an employee feels that inadequate resources, unreasonable time constraints, customer expectations, or other issues may compromise the integrity of true and accurate results, he or she has the right and responsibility to report their concerns to a higher source, i.e. department manager, quality assurance manager, or the president.

As a commercial company, Bowser-Morner recognizes that certain sources of pressure are inherent to the types of engineering and field services that the company provides. To assist employees in dealing with these pressures, Bowser-Morner has established and documented policies and procedures that address issues such as gifts and gratuities from customers, customer complaints, internal management pressures, and other possible sources of undue pressure. Refer to Bowser-Morner's quality system SOP QA-0110 for more details concerning impartiality and integrity of results.

5.1.4 Customer Confidentiality

As an independent commercial engineering and field services company, Bowser-Morner maintains a *Confidential Information Agreement* with each of its employees. The agreement policy expressly stipulates that at no time will it be disclosed to anyone not in the employment of Bowser-Morner, any designs, specifications, data, results, observations, or associated information, unless duly authorized to make such disclosures. Protection of the customer's confidentiality and proprietary rights is covered in a new employee's orientation program. A signed copy of the policy is maintained in the employee's file. Refer to Bowser-Morner's quality system SOP QA-0110 for more details concerning impartiality and integrity of results.

Registered professional engineers shall conform to the applicable laws and regulations in the jurisdiction in which they are licensed, regarding the safety, health, and welfare of the public. If time permits, before disclosing any potential customer confidential information, the professional engineer is to consult with the company president and/or corporate risk manager.

5.1.5 Additional Information

The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner Quality SOP QA-0110, *Integrity of Results and Protection of Customer Confidential Information*

5.2 Customer Focus

When establishing and implementing the company's quality management system, particular emphasis was placed on the chain of traceability from customer requirements through the delivery of the services. The quality-related issues of this process are more defined in *Sections 7.2 and 7.3* of this manual.

5.2.1 Expanded Approach

At Bowser-Morner, customer focus goes beyond just seeing that the customer's requirements are defined and met by our services. Customer focus also includes:

- a) Market analysis and strategic planning to identify those customers that need our services.
- b) Teaching as well as listening to customers through active membership in trade associations and conducting educational seminars.
- c) Keeping pace with newer technologies to meet customer needs.
- d) Focusing not only on the technical and regulatory aspects of our services but also at the customer's scheduling and cost aspects.

The success of the company's approach to customer focus is continually monitored with programs directed at measuring customer satisfaction (*Section 8.2.1*) and customer retention (*Section 8.4*).

5.2.2 Additional Information

The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner SOP QA-0240, *Measuring Customer Satisfaction by Survey*

5.3 Quality Policy

5.3.1 Bowser-Morner's Quality Policy

Our goal is for Bowser-Morner's services to be recognized among the best in our industry. To accomplish this we must not sacrifice quality in any of our efforts. At Bowser-Morner we define quality as meeting or exceeding the requirements of those we serve-our customers, regulatory bodies, industry standards, and each other. This begins with a commitment by top management to select, train, and retain quality people-engineers, scientists, technicians, and support personnel. These and other resources are then applied in an atmosphere that promotes quality to provide work that accurately and effectively presents our professional judgement.

We are dedicated to the highest professional ethics, value to our customers, and support of the public welfare. We believe that continued, measured growth is in the best interest of our customers, owners, and dedicated employees.

5.3.2 Additional Information

The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner's Employee Guide
- Bowser-Morner's Human Resources *Statement of Organization Philosophy*

5.4 Planning

5.4.1 Quality Objectives are Measured

Bowser-Morner's quality management system ensures that the company's quality objectives are defined and documented (*Section 4.2.1*), are measurable, and are monitored (*Section 8*). The relationship between each quality objective and the means of measuring compliance and improvement is defined in the following table.

Measurable Quality Objectives

Quality Objective	Section 4.2.1	Means of Measurement
Quality system manual and SOPs	a	Manual and SOPs are documented
ID, approval, and revision of documents	b, c	Documents are the current revision
Distribution of manuals and SOPs	d	Available to personnel on BMI_Public
Strategic planning	e	Annual marketing and resources plan
Define position responsibilities	f	Org. charts and position descriptions
Report to management	g	Annual report and dept. quality contracts
Recruit, train, maintain personnel	h, i	Training and competency records
Proper facilities and equipment	j, k, l	Safety audits, equipment calibration
Define customer requirements	m, n	Scope of work with each project
Project management – input, output, validation	o, p	Report format, completeness, peer review
Control of purchased items and services	q	Purchase order, approved subcontractor list
Measure and improve QM system	r	Customer surveys, audit reports, C.A.R.

5.4.2 Quality Management System Planning

Each year the quality assurance manager prepares and distributes a quality report to management. In this report the quality assurance manager defines the areas to be emphasized and the steps to be taken to correct and improve the quality management system in the upcoming year. A semi-quantitative or *graded* approach is used to evaluate each area of improvement. This graded approach takes into consideration the factors of potential benefits and losses, history of problems, safety, complexity, needed resources, and economic considerations.

Selected improvement activities may have varying degrees of impact on the different departments. The degree of impact will be reflected in a set of quality improvement goals that are established specifically for each department (*Section 5.6.3*). Refer to Bowser-Morner SOP QA-0270 for more details concerning the annual quality report to management.

When a significant change is made to the existing quality management system, the change is documented in the quality system manual and any associated standard operating procedures. Both the revised manual and the operating procedure(s) are reviewed and approved by management.

5.4.3 Strategic Business Planning

Each year, department managers are asked to prepare and submit a strategic business plan for the up coming year. The plan addresses the areas of: 1) marketing objectives and market opportunities, 2) the strategy and specific tactics used to implement the plan, 3) establishing fee strategy, 4) time lines for accomplishing major objectives, and 5) the resources needed to implement the plan. The department manager is responsible for communicating the plan's goals and actions to the staff.

The department manager, in conjunction with the marketing personnel, evaluate the opportunities associated with the department's market segment(s), determine the driving forces that create a demand for services, and evaluate growth trends over time. Tools used in the development are:

- Annual sales and marketing report (*Section 8.4*)
- Annual quality report to management (*Section 5.6*)
- Professional staff development (*Section 6.2*)
- Monitoring customer satisfaction and financial reports (*Section 8.2*)

5.4.4 Marketing Practices

Bowser-Morner has established policies and procedures to initiate and maintain business development practices including the handling of applicable marketing documents and materials. The company's marketing staff has primary responsibility for the preparation and updating of brochures, newsletters, qualifications, and other marketing materials, however, these activities may also be handled by department personnel with specific technical knowledge of a subject. The marketing staff also maintains up-to-date personnel profiles (*resumes*) of selected personnel.

Most marketing activities are a collaborative effort combining marketing, departmental, and management personnel. These activities may include:

- Responding to proposals (*Marketing & Departmental*)
- Personnel qualifications (*Marketing*)
- Technical qualifications (*Departmental & QA Department*)
- Quality management system compliance (*QA Department*)
- Contract review (*Departmental & Risk Management*)
- Contract negotiations (*Departmental & Risk Management*)
- Contract debriefing (*Marketing & Departmental*)

5.4.5 Additional Information

Bowser-Morner considers business and marketing as separate programs from quality assurance and as such, they are not defined in this manual. The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner SOP QA-0270, *Quality Report to Management*

5.5 Responsibility, Authority, and Communication

5.5.1 Position Responsibilities

The organizational structure, functional responsibilities, levels of authority, and lines of communication for activities affecting quality are defined herein. A company organizational chart helps to define the company's position responsibilities. This organizational chart is available in a Public Services folder located on the Company's server (*BMI_Public – QA Services*).

The Company

Bowser-Morner, Inc. is an independent commercial company that provides customers with reliable testing, engineering, observation, and subsurface exploration services. The company is comprised of two divisions: Analytical Services and Engineering and Construction Services.

The Board of Directors

Bowser-Morner, Inc. has a *board of directors* with the president serving as chairman of the board. These directors provide guidance on corporate issues.

The President

Bowser-Morner, Inc. is administered over by a *president*. The president has established and is responsible for maintaining the quality management system and the related policies and procedures associated with the company.

The president has delegated the authority, but not the responsibility, of the quality management system to an independent management representative; the quality assurance manager.

Chief Geotechnical Engineer

The *chief geotechnical engineer* gives technical guidance to the engineering staff and has final authority and responsibility for engineering work in the area of geosciences. The chief geotechnical engineer reports to the president of the company on matters of engineering. The chief geotechnical engineer is a registered professional engineer.

Department Manager

Due to the varied nature of Bowser-Morner's business activities, there are a variety of departments included in the company's organizational structure. Each department has a manager (however named). The department manager reports to the president as defined in the company's organizational structure.

The manager of each department is responsible for the engineering, consulting, or subsurface services (*including relevant quality requirements*) associated with their department. Each department manager reviews new work to verify that the appropriate resources are available before commencing such work.

The responsibilities of the department manager extend to include:

- Screening potential customers and projects before accepting work
- Preparing and final approval of customer quotations, contract review, and loss prevention measures
- Project tracking, establishing project schedules and budgets, customer invoicing and working with accounts receivable
- Professional development, review, and safety of department personnel
- Corrective actions and improvements
- Strategic planning, marketing, and customer relations

The department manager may delegate the authority, but not the responsibility, of these activities to a project manager or supervisor.

Responsible Delegates

Within the organizational structure, the manager typically functions as the responsible engineering and/or technical source for the department. The appointed responsible delegate for the department manager is the president of the company. The company president has the ability and authority to assume the role or name a temporary replacement in the extended absence of the manager.

The president is the assigned delegate with authority to act in the absence of the quality assurance manager, and any other adjunct position of key function such as financial officer, risk manager, safety officer, and marketing manager.

5.5.2 Management's Quality Representative

The management of Bowser-Morner has named a single *quality* management representative, the *quality assurance manager*. The quality assurance manager reports directly to the president. This direct access to the president permits the effective implementation of necessary actions.

The quality assurance manager has responsibility and authority to assure the establishment of appropriate quality system programs at the levels of the organization where it is deemed necessary by the president and the department managers.

The quality assurance manager has access to work areas and the organizational freedom to:

- a) Identify quality problems and report to management.
- b) Initiate, recommend, or provide solutions to quality problems through designated channels.
- c) Verify implementation of solutions.
- d) Monitor nonconforming processes until proper disposition of the problem, deficiency, or unsatisfactory condition has been corrected.

In the event of disputes, the president will have final authority.

5.5.3 Internal Communications

Open communications is emphasized and encouraged as part of Bowser-Morner's policies, objectives, and work culture. Within a department, individuals communicate on a routine basis and the use of formal and informal peer review is an integral part of the quality management system process.

Each department functions as its own decision-making center; however, interdepartmental communications are encouraged by management and supported by telephone, fax, and electronic media.

On a more formal basis, the company's policies and procedures are distributed to appropriate personnel and this distribution is controlled (*Section 4.2.3*). The quality assurance manager also distributes memorandums to management on a regular basis that detail specific issues of the quality management system. These issues typically include changes and revisions to policies and procedures, personnel and training, internal audit results, equipment calibration, and corrective actions. Refer to Bowser-Morner SOP QA-0300 for more details concerning communicating the Quality Management System.

5.5.4 Additional Information

The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner Organizational Chart
- Bowser-Morner SOP QA-0300, *Communicating the Quality System to Management*

5.6 Management Review

5.6.1 General

The quality management system and departmental activities are to be reviewed each year by management to maintain its continuing suitability and effectiveness and to introduce changes and improvements.

5.6.2 Review Input (Audits, Surveys, Reviews, Resolutions)

The quality assurance manager presents the review in a written quality system report. As it relates to engineering and subsurface exploration services, the report contains a review of the following:

- Summary of previous year's report to management
- Results from internal audits
- In-house quality activities
- Key quality objectives
- Anticipated changes and quality support
- Customer feedback
- Personnel and training
- Corrective actions
- Equipment and facility resources
- Internal quality contracts
- Summary of current year's report

5.6.3 Review Output (Response and Improvement)

Within the company's management structure, the responsibility to improve quality (*accuracy, completeness, responsiveness*) typically rest with the department manager. To identify specific areas and goals for improvement, the quality assurance manager enters into a *written* contract agreement with each manager. Based on the findings of the annual quality system review, a contract is developed for each department that typically lists four or more *measurable* goals for improvement. The department manager and the quality assurance manager sign the contract as part of an agreement to work together towards accomplishing these improvements.

5.6.4 Distribution

Copies of the report are distributed to management including the company president, risk manager, and department managers. A copy also goes to the manager of marketing and sales. The quality assurance manager controls the distribution of the report and retains the original copy on file.

5.6.5 Additional Information

The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner SOP QA-0270, *Quality System Program Review by Management*
- Bowser-Morner SOP QA-1705, *Internal Quality System Audit – QA-040*

SECTION 6 – RESOURCE MANAGEMENT

6.1 Provision of Resources

The selection, training, and retention of good employees are all paramount to the success of Bowser-Morner. The output of our employees is the services that we provide. In order to deliver quality services to our customers, we also must have appropriate physical (*facilities and equipment*) and technical (*field and laboratory*) resources for our employees.

It is Bowser-Morner's responsibility to provide an environment that supports individual professional development through training and experience while at the same time, fosters a sense of teamwork and mutual commitment to success.

Adequate resources are to be committed to the establishment, implementation, retention, and maintenance of the company's personnel, processes, facilities, and quality management system. This commitment includes the resources needed to meet daily customer expectations and long-term efforts for continuous improvement.

When needed resources are not available in-house, Bowser-Morner's subcontractor approval process (*Section 4.1.3*) allows our employees to select a competent outside source.

6.1.1 Additional Information

Due to the varied nature of Bowser-Morner's business activities, requirements for technical support such as field services and laboratory testing may be specified in appropriate departmental or contract quality assurance documents.

The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner – *Statement of Organization Philosophy*
- Bowser-Morner Human Resources Policies and Procedures – *Employee Recruitment/Selection*
- Bowser-Morner SOP QA-0710, *Use of Approved Subcontractors*

6.2 Human Resources

6.2.1 General

Many factors contribute to the correctness and reliability of Bowser-Morner's engineering and field services, however, none are more important than our people. To this end, the company makes a major commitment of time, effort, and resources to its employees.

Bowser-Morner maintains an effective human resources program to recruit, professionally develop, and retain its employees. This program is part of the company's administrative department. Human resources personnel establish and maintain employee records and control access to confidential records of personal information, employment, and salary history.

6.2.2 Training, Awareness, and Competency

Engineers, scientists, field technicians, and support personnel are to receive sufficient training and experience to perform their assigned duties. When a new employee is hired, he or she is considered to be a trainee for a probationary period of approximately three months. Departmental familiarization and indoctrination takes place early in this training period. This segment of the program is extremely flexible and varies according to the position being filled, the duration of the position, and whether the position is in the area of engineering or field operations.

The majority of training is performed as supervised on-the-job instruction. The department manager typically selects the trainer (*instructor*) based on the required education, technical knowledge, experience, and instructor skills (*organization and communication*) needed to conduct the training.

Engineers

Bowser-Morner uses several approaches to the training and promotion of professional development among our engineering staff. These include:

- On-the-job training
- Teaming
- In-house training programs
- Outside training

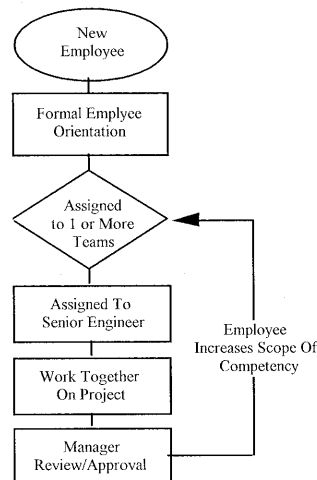
On-the-job training is the primary method used to teach a new engineer, or other trainee, how to perform a process. The trainee is assigned to a competent senior engineer who can clearly and accurately communicate how a specific task or function is to be performed. The senior engineer assumes the role of the mentor and guides the trainee through the training process.

These two will work together until such time as the senior engineer considers the trainee to be competent to perform the work on their own. At this time the trainee's skills are evaluated by the department manager, who is responsible to see that the training has been appropriate, understood, and retained by the trainee.

The completion of a project is typically a *team* effort. A team is comprised of individuals with different skills and the size and experience level of the team varies with the project or task. For instance, on a large or difficult project such as a large dam or refuse area design, a team consisting of the following may be formed:

- Project manager
- Senior engineer
- Engineer
- Engineer in training, and
- Support personnel including drafting and clerical

Although the trainee may be assigned to the senior engineer as his or her mentor, actual training may be done by the project manager, other competent engineer, or by one or more individuals of the support staff. In this way the trainee is exposed to a variety of learning opportunities, and by varying the teams and types of projects that the trainee is assigned to, an even broader scope of training and professional development can occur. It is, however, always the responsibility of the mentor to see that the training is properly conducted and the responsibility of the department manager to pass final judgement on the trainee's competency.



In-house training programs include computer software training, training on drafting and CADD systems, staff meetings on topics such as loss prevention awareness, and formal training sessions presented by Bowser-Morner such as our construction services seminars.

Examples of *outside training* include OSHA 40-hour safety, ASFE risk management skills and client relations training, seminars, and short courses. Many training opportunities are presented by manufacturers of civil and geotechnical engineering products including seminars and one-day courses such as the design of driven piles, design and construction of drilled deep foundations, bank stabilization using geo-textiles, seepage analysis, etc.

For professionals, Bowser-Morner's policy is that every individual should engage in some form of continuing education each year. Guidelines suggest that somewhere between three and ten working days per year is appropriate, depending on the individual involved.

Scientists and Field Technicians

For scientists (geologists, biologists, environmentalist) and field technicians (subsurface exploration), the department manager, or experienced designee, administers the job-training program. This is necessitated by the wide range of observation, testing, and exploration operations employed by Bowser-Morner. The trainee is typically assigned to an experienced instructor and given close supervision throughout the training process. At some point the trainee is considered to be competent to perform the assessment, test, or operation on their own. This evaluation is the responsibility of the department manager and may be done in conference with the instructor responsible for the employee's training.

Beyond the employee's initial training and determination of competency, there exists a program for the periodic review of each employee to evaluate and document *continuing* competency. The department manager will establish a method to determine job competence that typically includes frequency of performance, supervisor's observation, data review, and a one-on-one appraisal interview. Typically, each employee's performance and experience are reviewed on an annual basis.

Documentation

Documentation of training is established by the department manager and maintained by the quality assurance manager. Records are maintained for each employee that detail continuing education, approval of field procedures, dates of examinations and results, licensing and certification, and any observations of work performed, capabilities, and potentials. Training records are always available for review by the department manager and employee in a public services folder located on the company's server (*BMI_Public – QA Services*).

Education and Experience

The chart below shows the general personnel classifications and qualifications adopted by Bowser-Morner's engineering and subsurface exploration departments.

Job Title	Education	Experience
General Management	This individual, or group of individuals, may or may not be involved at the technical level. They should become familiar with the broad technical aspects of the business, so as to make policy decisions consistent with quality requirements	
Engineering Staff	Minimum of B.S. degree in civil or geotechnical engineering	Minimum of 1 year in the area(s) of engineering which they are involved
Department Manager	B.S. degree or 5 years experience, both relevant to the technology supervised	1 year with degree or 5 years w/o under qualified technical supervision pertinent to the field of work
Scientific Staff	B.S. degree pertinent to the field of work	On-the-job training by supervisor or designee
Technical Staff	High school graduate or equivalent	Sufficient on-the-job training and/or trade school.
Support Staff	Sufficient on-the-job training with oversight by the department manager so that he or she performs their job properly	

Contracted Personnel

On occasion Bowser-Morner uses the technical services (*laboratory testing, field surveying, etc.*) of someone not employed by the company and therefore have not been approved as *competent* under the company's training and evaluation programs. In such cases it is the department manager's responsibility to see that the contracted company/person is on the Bowser-Morner approved subcontractor list.

Job Descriptions

For non-engineering positions, departments maintain a set of job descriptions that outline the *general* requirements for the managerial and technical positions as they appear on the department's organizational chart. Job descriptions typically contain a position overview, list of key technical and quality-related responsibilities, education and background requirements, and the reporting relationship to other positions within the department and/or company.

Personnel Profiles

Brief personnel profiles (*biographical sketches*) of selected engineers and technical personnel in management and supervisory positions are available. The personnel profile contains information about the individual including name and title, education, work experience, and licensure/certifications. The marketing department maintains current personnel profiles.

Professional Development and Advancement

Bowser-Morner's management encourages continuing education and registration of its professional and technical staff. Employees develop professionally and technically through several methods including experience, education, seminars, trade shows, professional licensure, certifications, and professional organizations.

Bowser-Morner supports and encourages graduate studies depending on the individual and the relevance of the studies to the employee's job. The types of support include paid time off for courses and thesis projects (*considered as part of training*) and reimbursement of tuition expenses. Both the department manager and the employee agree to this policy before payment for the course is approved.

As part of company's professional development policies, Bowser-Morner encourages and supports the registration, licensing and/or certification of its professional and technical staff. Many of our professionals are registered engineers or geologists in one or more states. Technical staff may be licensed or certified under government and independent programs such as the Environmental Protection Agency (EPA), Department of Natural Resources (DNR), and the National Institute for Certification in Engineering Technologies (NICET).

Policies for development and specific criteria for advancement are communicated to affected personnel through regularly scheduled meetings conducted by the department manager.

Signatories

The company has a policy that addresses the signing of engineering and field services reports. The signature on a Bowser-Morner report identifies the person accepting responsibility for the adequacy of the report's contents. Signatories are chosen based on their involvement, understanding, experience, and licensing. It is the responsibility of the department manager to define the scope of each employee's approval to sign reports and other technical documents.

6.2.3 Safety

Safety is part of each new employee's orientation and probationary period of training. Safety training typically includes: proper operation of equipment, proper handling of chemicals and toxic waste, safety aspects of working on a construction site, and a review of the "Right to Know" law and materials safety data sheets (MSDS). Additional safety training is provided by monthly safety meetings and is documented through Bowser-Morner's corporate safety and facilities department.

As applicable to the type of work that the employee is performing, Bowser-Morner administers a medical monitoring program through an occupational health care organization.

The company's safety performance is measured regularly and employees earn quarterly and annual incentives and awards based on their performance. Employee safety and health is considered as a separate program and only *touched on* in this quality management system manual.

6.2.4 Additional Information

Due to the varied nature of Bowser-Morner's business activities, additional requirements for instructions, procedures, and training may be specified in appropriate departmental or contract quality assurance documents.

To promote job advancement and professional growth, the department manager may request that human resources post staff openings and permit current employees to apply.

The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner Human Resources, *Policies and Procedures Manual*
- Bowser-Morner SOP QA-1800, *A Program for Training In Field and Laboratory Operations*
- Bowser-Morner SOP QA-1810, *A Program for Periodic Review of Employee Competency in Field and Laboratory Operations*
- Bowser-Morner Safety Manual
- Bowser-Morner Chemical Hygiene Plan

6.3 Infrastructure

6.3.1 Infrastructure

Appropriate facilities, equipment, and support services are to be provided for Bowser-Morner's staff of engineers, scientists, and technical personnel. As applicable these include:

- a) Adequate space, and furnishings.
- b) Process equipment including computers and automated drafting.
- c) Support services (*communications, technical writing, shipping and receiving, computer hardware & software, etc.*).

Attention to proper facilities, equipment, and support services applies to *on-site* sampling, testing, and observation activities as well as the department's permanent facilities.

6.3.2 Additional Information

Due to the varied nature of Bowser-Morner's business activities, the requirements for facilities, equipment, and support may vary significantly between departments and between activities performed within the facility or on-site in the field (*particularly subsurface exploration work which is essentially all on-site*). It is the responsibility of the department manager to see that the facilities, equipment, and support services appropriate to the type of work being done are established and maintained.

The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner Employee Guide

6.4 Work Environment

6.4.1 Work Environment

Appropriate working conditions are to be provided that consider both physical and mental aspects. These workplace factors include:

- a) Physical conditions such as temperature and humidity control, proper lighting, and sound protection.
- b) A mental environment of support and teamwork that promotes honesty and objectivity and discourage conflict and other pressures.

At Bowser-Morner we take the safety of our employees *very* seriously. We strongly believe the following:

- Accidents and injuries are preventable
 - Management is responsible for providing a safe work place
 - Compliance with federal, state, and local regulations
 - Employees receive safety training
 - Safety makes good business sense
- Bowser-Morner employees must take safety seriously. In conjunction with employee safety training and the OSHA Hazard Communication Standard, the company has developed a hazard communication policy. This policy is designed to implement the following primary objectives:
 - a) Identify potentially hazardous substances in the work place.
 - b) Obtain material safety data sheets and appropriate labels.
 - c) Provide employee information and training.

Attention to environmental work conditions applies to *on-site* activities as well as the department's permanent facilities.

6.4.2 Additional Information

Due to the varied nature of Bowser-Morner's business activities, the requirements for an appropriate work environment may vary significantly between departments and between work performed within the facility or on-site in the field (*particularly subsurface exploration work which is essentially all on-site*). It is the responsibility of the department manager to see that a physical and mental environment appropriate to the type of work being done is established and maintained.

The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner Employee Guide
- Bowser-Morner Hazard Communication Policies and Procedures Manual

SECTION 7 – SERVICES

7.1 Planning of Process Realization

A *process* is a sequence of related activities that has both input and output. Bowser-Morner's management is committed to ensuring the effective and efficient operation of its processes. As a provider of services in the areas of civil and geotechnical engineering and subsurface exploration, our process input (*customer requirements*) is typically defined in a scope of work and our output (*deliverable product*) is most often a report.

7.1.1 Issues to be Considered

The degree to which a process can be defined and documented varies greatly with the types of services that Bowser-Morner provides. At one end is the engineering design of a *unique* structure like an earthen dam, and at the other end is the relatively *routine* installation of a monitoring well. However, throughout all associated processes, certain key issues need to be considered. These issues include:

- a) Identification and communication of the customer's requirements.
- b) A defined and documented scope of services to be provided.
- c) Ensuring the health and safety of our people.
- d) Identification, assessment, and mitigation of risk.
- e) Needed resources - trained personnel.
- f) Sharing knowledge and experience in teams and work groups.
- g) Time and cost constraints.
- h) Verification of processes and validation of the final services.
- i) Records needed to provide evidence that the services meet requirements.
- j) Analysis and review of the processes.

As applicable, consideration to improvement is part of the planning for both input and output. Improvement efforts are generally focused on means of achieving a higher level of customer satisfaction, better use of company resources, personnel safety, and profitability.

7.1.2 Additional Information

The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner SOP QA-0210, *Quality System Structure -- Engineering and Subsurface Operations*

7.2 Customer-Related Processes

7.2.1 Determination of Requirements Related to Services

Whenever possible, the customer's request for engineering design, consultation, assessment, or subsurface exploration services should be documented in a written request or tender. For most departments, this documentation is a customer-supplied request for proposal. At a minimum, the documentation should include the following information:

- a) The customer's name, address, telephone number, and contact person.
- b) The services requested including the specific methods to be used.
- c) Any specifications or acceptance criteria that the services must comply with.

Whether or not the customer provides a written statement of requirements, the customer requirements are to be documented in the scope of work (*SOW*) section of Bowser-Morner's quotation to the customer. Refer to Section 7.3.2 for more on documenting work services.

7.2.2 Review of Requirements Related to Services

The department manager, or a designee, is to review the customer's request to confirm that the required services are appropriate and that the department possesses the necessary resources (*personnel, procedures and skills, equipment, etc.*) to provide the services. This review is to be conducted prior to any commitment to the customer to take on the work. The review is to ensure that:

- a) Service requirements are well defined.
- b) Any applicable statutory or regulatory requirements are identified.
- c) Any potential safety hazards are identified.
- d) Any differences between the customer's request and Bowser-Morner's proposed services are resolved before work commences.

A review of the requested *SOW* may include the identification of any work that will be subcontracted to an outside source. Refer to Section 4.1.3 for more on subcontracting services.

7.2.3 Customer Communication

Contracts

A contract is Bowser-Morner's agreement to provide the customer with engineering, consultation, and/or field services. The contract shall include a *SOW* that documents the services to be provided and any specific requirements or acceptance criteria that must be met.

A Bowser-Morner *agreement for services* shall be presented to the customer before work commences. As part of the agreement, a set of *terms and conditions* shall be included.

For consistency and efficiency, Bowser-Morner's risk manager has standardized the wording of the agreement. The wording of this standardized agreement shall not be changed without the approval of the risk manager, chief financial officer, company president, or other authorized personnel. Refer to Section 7.3.2 for more details concerning contracts.

Customer Feedback and Approval

The department manager, or a designee, with technical knowledge of the required services, is to review the contract's SOW to confirm that it matches the customer's request. Any difference between the customer's request and the requirements of the contract's SOW are to be brought to the customer's attention and needs to be resolved between the customer and Bowser-Morner before the work commences.

If the SOW needs to be changed after work has started, the department manager is responsible to see that the changes are properly communicated to, and approved by, the customer.

Whenever practical, a written record of any changes to the SOW and any relevant discussions with the customer should be documented and maintained as part of the client/project records.

Customer Complaints

The customer, and other parties having dealings with Bowser-Morner, may communicate (*voice*) a complaint. The effective handling of a complaint is necessary to maintain quality operations (*stability and effectiveness of the quality management system*), introduction of any necessary changes (*corrections and improvements*), and goodwill (*both the customer and employee*).

Any company employee may receive or become aware of a complaint from a customer or some other party. While final responsibility for handling the complaint lies with management, whoever receives the complaint should gather as much information about the problem as possible and see that the appropriate manager, or above, is notified.

For most complaints, the department manager will review the information and determine if the complaint warrants a formal investigation and corrective action response. Guidance on determining when a problem becomes a *formal documented* complaint can be found in Bowser-Morner quality assurance SOPs QA-1900 addressing technical issues and QA-1910 that addresses non-technical concerns.

Documented complaints are handled by integration into the company's corrective action process (*Bowser-Morner SOP QA-1400*). The investigation, apparent *root* cause, and appropriate corrective action(s) are documented using a corrective action response (*C.A.R.*) form controlled by the quality assurance manager.

As applicable, the department manager is responsible to see that the customer or other party is informed of the results of the investigation. When necessary, the quality assurance manager is to audit the area in question as part of the formal corrective action process (*Section 8.5.2*).

Invoicing and Accounts Receivables

Timely and consistent invoicing to the customer is the responsibility of the department manager who may delegate this activity to the project manager. Most short-term projects (4–6 weeks) are invoiced at completion by the project manager (*Section 7.3.3*) while longer-term projects are invoiced, whenever possible, on a monthly basis. Quite often, monthly invoices accompany project status reports that are issued to the customer. The project manager reviews short-term project invoices while the department manager reviews most long-term invoices for accuracy before being sent to the customer.

Periodically, the company's financial officer issues account receivable and work-in-process reports to the department managers. Efforts are made to communicate with customers of over due accounts and the department manager may send out over due notices. At some point (typically past 120 days) the delinquent customer may be notified that their account is being turned over for collection. A selected group that includes the department manager, chief financial officer, corporate risk manager, and company president controls the authorization of this last effort, including possible legal actions.

Invoices are considered operating records and a copy is to be placed in the customer's project files (*Section 4.2.4*).

7.2.4 Additional Information

The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner SOP QA-1400, *Corrective Action Response*
- Bowser-Morner SOP QA-1900, *Handling Technical Complaints from Customers and Other Parties*
- Bowser-Morner SOP QA-1910, *Handling Non-Technical Complaints from Customers and Other Parties*

7.3 Design and Development

7.3.1 Design and Development Planning

The department manager is responsible for seeing that the design and development of each project is properly planned. During the planning stages of each project, the following components should be considered.

- Project manager
- Approach
- Team
- Resources
- Risk management
- Health and safety
- Reviews and verifications

The *project manager* is the individual assigned to direct the project from the planning stages to final closure. The project manager (however named, i.e. department manager, supervisor, etc.) determines how the work is to be performed and who actually performs the work. The project manager's responsibilities include but are not limited to the following:

- a) Determine the appropriate approach to the work including the selection of a technically competent team (including possible consultants and subcontractors) with the necessary education, skills, expertise, and special requirements (*regulatory and contractual*).
- b) Identify the proper design criteria, codes, and standards to which the work must conform.
- c) Communicate, as needed, with the customer throughout the project including times of decision before any budget overruns, before the invoice is sent, and after the report has been submitted.
- d) Supervise the work progress including associated quality functions, the budget, time schedule, reviews, reports, and invoicing for accuracy and completeness.
- e) Coordinate any inter departmental and subcontracted work.
- f) Practice Bowser-Morner's loss prevention and safety policies.

The *approach*, how the work will be performed and reported, is to be identified in a scope-of work (SOW). As applicable, the SOW needs to clearly define the specific services to be provided by Bowser-Morner in terms of design requirements, exploration, sample collection, materials, and contents of the final report.

The project manager plans for the *team's* skills, experience, and credentials that will be needed to complete the project and evaluates these needs in relation to the company's qualified and available personnel. Developing the team may include the selection of one or more subcontractors (*Section 4.1.3 for subcontracted services*). Opportunities for in-house training of professional and technical staff and interfacing between different departments and work groups (*consultation and collaboration*) is encouraged and should also be identified as part of the planning process.

The project manager plans for the *resources* that will be needed including as applicable, the capabilities, capacity, and availability of: subsurface exploration rigs and test equipment, computer aided design and engineering (CAD/CAE) systems, and financial (time and cost) information systems.

In the early stages of planning, some consideration should be given to assessing any *risks* associated with the customer's request for services. The anticipated risks may be minimal when performing routine work or more substantial when performing one-of-a-kind designs or when work site conditions require special consideration.

Within the limitations of initial knowledge about the project's design, scope of work, and on-site work conditions, the project manager should consider any foreseeable *health and safety* issues. These issues may include work conditions, the handling of hazardous materials, and compliance with any customer specified health and safety requirements.

Periodic *reviews* (*Section 7.3.4*) should be scheduled throughout the work process and a final *verification* (*Section 7.3.5*) should be conducted before the final report is issued to the customer.

7.3.2 Design and Development Inputs

Design Input

The design of a process whether it's an engineered system or structure, consultation, testing and observation, or the process of subsurface exploration, is to be performed in accordance with planned and defined input criteria. These input criteria may be provided by the customer or may be prepared by Bowser-Morner as part of the service to the customer.

Input criteria should include pertinent functional, engineering, and quality related requirements such as:

- Applicable standard practices
- Applicable statutory and regulation codes
- Client specified criteria (i.e. budget and time schedule)
- Design and functional (performance-based) criteria
- Safety related issues
- Quality assurance and quality control requirements

Contractual Agreement

A complete and accurate understanding of each customer's project is one of the *most important* aspects of the engineering and subsurface services that Bowser-Morner offers. The achievement of quality, defined as meeting or exceeding our customer's expectations, is based upon the understanding that the services provided must conform to the expressed requirements. Good practice dictates that these requirements be clearly defined and agreed to by both the customer and Bowser-Morner. A documented agreement containing a comprehensive and clearly identified SOW and term and conditions serve as the basis for this understanding.

Bowser-Morner has developed a specific format and standardized wording for contractual agreements between the customer and Bowser-Morner. The agreement contains information about the customer and Bowser-Morner (i.e. name, address, telephone number, etc.), identification of the document as relating to a specific technical and cost proposal, and the date of the agreement.

The contract typically contains essential sections of information that include:

- Detailed scope of work (SOW)
- Budget
- Time schedule
- Terms and Conditions
- Authorization

The SOW clearly identifies the services to be provided by defining specifics in terms of engineering and technical services, designs and drawings, labor, sample collection, materials, and contents of the final report. If any limitations exist, these should also be clearly stated (*what is not to be covered by the project's scope of work*).

The *budgeted* cost associated with the defined SOW may be expressed as a lump sum or a range.

Based on the SOW and information supplied by the customer, the proposal will typically include a statement addressing the anticipated amount of *time* required to complete the project.

Each *contractual agreement* shall include a standardized document containing information about Bowser-Morner and the customer (i.e. name, address, telephone and fax numbers, etc.), identification of the document as relating to a specific technical and cost proposal (i.e. proposal number and project name), and the date of the agreement.

Included is Bowser-Morner's *terms and conditions agreement*. The contents and wording of the terms and conditions has been standardized for the various types of services provided (engineering design, environmental, geotechnical, subsurface exploration, etc.) Based on the proposed services, the standard terms and conditions may be a single or multi page attachment.

The designated project manager has the *authority* to prepare and sign a written proposal including attaching the appropriate contract agreement and to send them to a potential customer. However, only certain individuals within the company have the authority to negotiate and agree to changes in the standard terms and conditions or client-provided agreement. Throughout Bowser-Morner's office locations, these individuals are:

<u>Name</u>	<u>Title</u>	<u>Office Location</u>
Steven M. Bowser	President	Dayton, OH
Timothy M. Staley	Manager, Corporate Risk	Dayton, OH
Scott D. Kinney	Chief Financial Officer	Dayton, OH
J. Richard Hoppenjans	Vice President	Toledo, OH

Final decision and acceptance on all negotiated matters shall be approved by one of the individuals listed above.

For more information on approval of agreements and contracts, refer to Bowser-Morner SOP QA-0400.

7.3.3 Design and Development Outputs

Our written report normally represents the primary product of our service to the customer. As such it must be presented in an organized and comprehensive format. The report writer, typically the project manager, is responsible for assembling the technical data and then preparing the report. To be effective, a report should be:

- Prepared in a readable format that conforms to contractual obligations
- Concise
- Technically correct
- Supportive of professional liability and loss prevention objectives
- Complete in meeting the customers expectations, to the extent, professionally and ethically, possible

A Word to Report Writers

Report reviewers spend considerable time and effort to help you prepare better reports; reports that better meet customer expectations and adhere to technical and risk management standards. Reviewers are reading your material for the first time, as a customer would. Review comments depend in large measure on the text, supportive data, and graphics you have prepared.

Reviewers should discuss their comments with you. These comments may relate to matters such as changes in text, topics for additional study, suggestions for improvement, structure, presentation, or grammar. Accept these comments and suggestions graciously and professionally. Learn from them and if you have questions, speak with the reviewer to discuss their comments. - *ASFE Guide To In-House Review of Reports*.

Scope of Work

The report writer must consider the agreed to SOW between Bowser-Morner and the customer when preparing the final report. The contents of the report should address these services and contain comments relating to the extent to which the report fulfills the SOW.

Report Preparation and Format

Standard engineering reports such as soil investigation reports are written based upon a template. The template *standardizes* the report format while prompting the writer to include essential engineering data and recommendations. The template is available in both a short and long form, the selection criteria being based on the SOW to be covered in the report. Both short and long formats include the following sections:

- Cover page identifying the project, the customer, the Bowser-Morner report number and the date
- A header section
- Demographic information
- Introduction
- Technical data
- Findings, designs, and recommendations
- Footer
- Signature Block

At a minimum, the *cover page* should reference the project name, the customer, the Bowser-Morner assigned report number, and the date of report preparation.

The *header* identifies the report as Bowser-Morner's along with the street address, mailing address and telephone number of the office producing the report.

Demographic information includes the customer's name and address, name of contact person, customer authorization number, and brief description or identification of the project.

The *introduction* discusses the purpose of the work as it relates to the project's SOW including any limitations or areas that are not addressed in the report.

Technical data includes, but is not limited to, field and laboratory test data, boring logs, descriptions of observation, and drawings and sketches. Test data and observations may be expressed in descriptive form or as tables of data and may be included as part of the body of the report or as appendices to the report.

Findings, designs, and recommendations take the technical data and observations and state conclusions and where appropriate, make recommendations. Findings and recommendations express the engineering facts, designs, applications, and opinions as they relate to the SOW. It is important that the wording used be clear and concise and that the reader is able to distinguish fact from opinion. Standard language is included which recommends to the customer the use of Bowser-Morner's construction-phase (monitoring and testing) services to provide a continuity of service to the customer, and to confirm that actual field conditions are consistent with those anticipated.

The bottom of the first page of each report (not including the cover page) is to contain a *footer* with the following: *All Reports Remain The Confidential Property of BOWSER-MORNER And No Publication Or Distribution Of Reports May Be Made Without Our Express Written Consent, Except As Authorized By Contract.*

The *signature block* contains the typed name, signature, and title of the person, or persons, accepting responsibility for the contents of the report. An authorized professional engineer signs all Bowser-Morner engineering design reports.

Just as efforts have been made to standardize report formatting, so have efforts been made to standardize the language used in the report. Obviously each report is different in its SOW, findings, designs, and recommendations, however the language used within the context of practicing risk management, can be standardized into those words and expressions that are "*acceptable*" and "*not acceptable*". Engineers and geologists are trained to rely heavily on standardized language to reduce liability and increase efficiency in report preparation.

Lists of inappropriate words, phrases, etc. are routinely circulated and discussed. Risks and limitations in our reports are the responsibility of the project manager and the peer reviewer (*Section 7.3.5*).

Drawings and Details

Engineering drawings fall into one of two categories:

- Sketches
- Drawings

Engineering *sketches* are typically used for preliminary designs, layouts, and conceptual studies. Field sketches are most often used to document the location of an observation, sample collection, and/or test. Sketches may be included in the final report provided they have been titled, reviewed, and identified as part of the project (*i.e. project name, number, date*).

Drawings are used to illustrate engineering designs, components, systems, and structures. Drawings are controlled documents in the same manner as the report. A drawing produced by Bowser-Morner as part of the design output process is identified by project name, date, and revision number. A drawing supplied by the customer, as part of the design input process is given in-house identification by labeling with the customer name and date.

Refer to Bowser-Morner SOP QA-0230 for more details concerning document control.

Bowser-Morner approved methods for illustrating typical drawing details (*i.e. structure footers, culverts, standpipe piezometer installation, etc.*) have been computerized and are to be used, as applicable, for final presentation of drawings.

Closing a Project

On large projects, billing is done periodically throughout the project. Many projects, however, are relatively small and even though they last more than a month, are normally billed at completion. The goal is to bill all active jobs at least once a month.

A separate file is maintained for each active project. Instructions, procedures, memorandums, including change orders, reports, and billing information are kept in this file until the specific work has been billed. Originals of *important* information relating to the project are not to be retained outside this file, however, copies of information may be retained by the project manager for future reference. Preliminary report drafts which are not signed are to be destroyed.

Subsequent to project completion and billing, the files are placed in long-term storage. Each file is identified by project number and customer name. Bowser-Morner keeps a cross-reference file on all projects, which are available by computer search of the project number. Copies of drawings are normally stored in the long-term file with the other records. Mylars and reference drawings are kept separately in designated flat-file drawers. Bowser-Morner's SOP QA-1610 addresses in more detail the retention and destruction of documents.

7.3.4 Design and Development Review

Periodically throughout the development and design process, a critical review of the design should be conducted. The frequency of these reviews is part of the project's design and development planning (*Section 7.3.1*). At least one review should be conducted for each phase of the design and development process.

These in-process reviews should be separate from any scheduled project progress meetings that primarily address concerns of time and cost. The design reviews are conducted to: 1) assure that the design output meets the input requirements, 2) identify and anticipate problem areas and inadequacies, and 3) initiate necessary corrective actions.

Project process reviews may be conducted by using one or more of the following control measures:

- Design review conducted by a peer or a supervisor
- Review by a selected consultant
- Use of qualification testing and demonstration
- Carrying out repeat and/or alternative calculations
- Comparing the new design with a similar proven design

As applicable, records of these in-process reviews should be maintained and added to the project file.

7.3.5 Design and Development Verification

The design of a component, system, structure, or installation process and any work that requires an engineering and/or scientific judgment, expression of an opinion, mathematical calculation is subject, as applicable, to a verification process that may include one or both of:

A *peer review* by an individual equivalent to the engineer or project manager in work related experience.

A *supervisor review* by a senior engineer and/or scientist who has supervisory responsibility - quite often this will be the department manager.

This verification process is repeated until the design output meets the design input criteria developed at the beginning of the project. Only when the peer/supervisor have determined that the acceptance criteria have been met, can the design be submitted for final reporting to the customer.

The verification process should be documented on a Bowser-Morner report review form or some similar checklist format and the form placed in the project file.

Qualification Testing and Demonstrations

For certain types of designs, it may be possible to support the verification of a design by use of a model or prototype. If this method of verification is used, the test programs and procedures should be clearly defined and the results documented and placed in the project file.

Report Contents

Studies, engineering reports, and technical memorandums are subject to verification by peer review before being issued to the customer. The peer review process should use some form of a review checklist that is to be completed by the reviewer.

A Word to Report Reviewers

Studies have found that report reviewers are most effective when presented in a positive, constructive tone. Harsh criticism serves no beneficial purpose. If you have questions, speak with the report writer; doing so can be most beneficial. Then, once you have completed your review, meet with the writer and go through your suggestions together. This is a part of the learning process that helps develop insight and confidence. - *ASFE Guide to In-House Review of Reports*.

Guidelines for the review of a report are separated into four subject areas:

- Contractual obligations
- Technical content
- Risk management
- Clarity of presentation

The review should evaluate the report's ability to fulfill Bowser-Morner's *contractual obligations* relating to the purpose of the report, the agreed to SOW, any work performed outside the original SOW, and any conclusions drawn and/or recommendations made.

Technical contents include a review of field observations and measurements and laboratory test results, interpretation of the field and laboratory data, engineering designs, and calculations including any computer software used.

Good communications between Bowser-Morner and the customer is good *risk management*. The report should be clearly worded, avoiding the use of engineering jargon and superlatives. As applicable, the report should convey that civil and geotechnical engineering relies heavily on interpretive skills and judgement, and that the materials and conditions being analyzed are variable. Whenever possible, the degree of uncertainty and representativeness of field and laboratory findings should be stated in the report.

The report should present the findings and recommendations in a way that clearly and readily conveys to the customer, Bowser-Morner's understanding of the project and the relevance of evaluations and recommendations. In evaluating *clarity*, the report should effectively convey the understandings, findings, recommendations, limitations, and risk to the customer.

Example -Design and Report Review Checklist and Documentation Form

REPORT REVIEW FORM - GEOTECHNICAL/SUBSURFACE JOBS (To be completed when report goes to typing)		
Report Title & No.:		
Today's Date:	Date Report Prepared:	Date Report to Typing:
Author:	Peer Review Name:	Peer Review Date:
Date First Draft Required:	Date Report to Go Out:	Date Report Went out:
Author Edit Date:		
REPORT REVIEW TASKS (to check off by peer reviewer. Author to make sure report file is organized and complete before giving to reviewer.)		
<input type="checkbox"/>	1	Scan boring location plan and boring logs to develop conceptual understanding of the project and soil profile.
<input type="checkbox"/>	2	Read report to determine that: A. Technical data is presented clearly • Authorization (P.O., Quote, verbal (?), change order, etc.) • Work performed (field and lab) • Soil profile (topsoil, fill, stratification, soil strength and groundwater levels) • Project description (type construction and loads) • Evaluations and conclusions (summary, site preparation, structural fill, foundations, construction concerns, groundwater, slabs, retaining walls, pavements. • Qualifications B. Review quote and RFP to make sure that scope of work has been completed. If scope has changed, do we have a change order?, and is reason explained in the report?
<input type="checkbox"/>	3	Check calculations/analysis methods (initial calculation sheet)
<input type="checkbox"/>	4	Check to see that elevation data was verified.
<input type="checkbox"/>	5	Check boring location plan.
<input type="checkbox"/>	6	Briefly review soil lab data.
<input type="checkbox"/>	7	Correct typos.
<input type="checkbox"/>	8	Mark-up draft report with all corrections.
<input type="checkbox"/>	9	Discuss any major changes/problems/questions with author or report.
<input type="checkbox"/>	10	Sign and date review form.
<input type="checkbox"/>	11	Return report to typing if changes are not major. Otherwise, give to author for corrections.
Comments:		

Calculations - Manual

When applicable, calculations and other manipulations of numerical data are to be checked by an individual not responsible for performing the calculation. This checking may include verification of formulas used and verification of actual computations.

Calculations - Computerized

Computer generated data is an extension of the paper records of a project. Just as manual calculations are to be checked, systematic checking of computerized manipulations of data and calculations should be a part of the review process. Even though the software has been validated, it should always be evaluated for consistency of output.

As applicable, both manual and computerized design calculations may also be verified by using alternate formulas to the original computations. Verifications should be documented and placed in the project file.

Comparison to Proven Design

In the verification of engineering designs, work experience is an important factor. In part, this is why Bowser-Morner uses a verification process with the review typically conducted by a senior engineer or scientist. Through the reviewer's experience, it may be possible to compare the design under verification, with one or more similar designs that have proven to be successful in their applications. Use of this type of comparison should be noted by the reviewer and placed in the project file.

7.3.6 Design and Development Validation

The process of validation comes from the actual construction of a structure or installation of the system for which design and development were performed. Whenever applicable, Bowser-Morner includes observation, testing, and subsequent monitoring services as part of the original proposal to the customer. If the customer chooses to retain Bowser-Morner for these construction phase services, the validation is concluded as the structure or system of design is completed and placed into use. In cases where the client chooses not to retain Bowser-Morner, such validation may not be possible. This possibility is to be addressed through standard language in the engineering report, and depending upon the circumstances, through follow-up communication with the client.

For subsurface exploration services, final validation occurs when *acceptable* samples of soil and/or aggregate have been collected for subsequent evaluation and laboratory testing or when an installed monitoring well is placed into service.

7.3.7 Control of Design and Development Changes

Design and development changes are to be identified and records of the changes are to be maintained. Typically a revision number identifies changes to design records such as plans, drawings, and specifications. Changes are to be reviewed, verified, and approved by the project manager before implementation.

7.3.8 Additional Information

The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner SOP QA-0230, *Quality System Documentation and Records*
- Bowser-Morner SOP QA-0400, *Review of Requests, Tenders, and Contracts*
- Bowser-Morner SOP QA-1610, *Document Retention and Destruction*

7.4 Purchasing

7.4.1 Purchasing Process

Bowser-Morner controls purchased items and services by the use of a purchase order/service agreement form. The purchase is to be approved and the form signed by the department manager or their designee, to verify that appropriate quality related information is included with each document. After approval, any changes to the purchase order are subject to the same degree of control as utilized in the preparation of the original document.

For subcontracted field services, laboratory testing, and the purchase of supplies that can affect the *quality* of work, a Bowser-Morner approved subcontractor is to be used. The quality assurance department maintains a list of approved subcontractors whose competency has been verified as described in Section 4.1.3. This list of approved subcontractors is available in a public services folder located on the company's server (*BMI_Public – QA Services*).

The purchaser should ask two questions to determine if an approved subcontractor is needed. First, is the quality of the purchased item or service of *critical importance* to the success of the work being performed? Secondly, are there in-house *checks* in place to verify quality before the purchased item or service is released for use? If the answer to the first question is “yes” and the answer to the second question is “no”, then an approved subcontractor needs to be used.

Refer to Bowser-Morner's quality assurance SOP QA-0710 for more details concerning the selection of approved subcontractors.

7.4.2 Purchasing Information

Space for most of the required purchasing information is formatted in the purchase order form. This information includes a unique purchase order number, ship to address, quantity, price, signature of person requesting the purchase, and approval signature.

The department manager is responsible to see that any needed *quality* requirements are included on the purchase order form. Typical information may include:

- a) Requirements for approval of the service or item (*i.e. specific test methods, equipment capability and calibration, etc.*).
- b) Any applicable statutory or regulatory requirements.
- c) Any licensing and/or certification requirements.

Refer to Bowser-Morner's quality assurance SOP QA-0700 for more details concerning the purchasing of services and supplies.

7.4.3 Verification of Purchased Products and Services

When procured items such as chemicals and test equipment are received, the packing slip or receiving slip is to be checked against the original purchase order and the items received. If the check proves to be satisfactory, the receiving or packing slip is to be initialed and dated by the person verifying the match. If they do not match, the appropriate department manager is to be contacted to resolve the problem.

Field services such as survey reports and laboratory services such as test results are to be reviewed for the appropriate use of test method, data accuracy, and completeness. The department manager, or a designee, should review the subcontractor's report, including any associated quality control data, and determine whether, in their opinion, the results are accurate. If the subcontracted service involves the design and/or the manufacturing of a product, the manager or designee should physically review the work or product to verify that any quality related requirements have been met. In cases where the accuracy of the test results or quality of the design or manufactured product is in doubt, the manager or designee is to promptly contact the subcontractor to resolve the issue.

The department manager is to understand that he or she is responsible for selecting a qualified subcontractor (*Section 4.1.3*), except in the case where the customer or a regulatory authority specifies which subcontractor is to be used. Within Bowser-Morner's technical scope of knowledge, the department manager should see that subcontracted results are reviewed and validated before being released to the customer.

Any nonconformance in the condition or verification of a purchased item or service is to be brought to the attention of the quality assurance manager. It is the responsibility of the quality assurance manager to maintain records and monitor the performance of subcontractors. Refer to Bowser-Morner's quality assurance SOP QA-0810 for more details concerning nonconformance of purchased services and supplies.

7.4.4 Additional Information

Due to the varied nature of Bowser-Morner's services, additional requirements for procurement of services and supplies may be specified in appropriate departmental or contract quality assurance documents.

The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner SOP QA-0700, *Purchasing and Control of Services and Supplies*
- Bowser-Morner SOP QA-0710, *Use of Approved Subcontractors*
- Bowser-Morner SOP QA-0810, *Subcontractor Nonconformance*

7.5 Service Provisions

7.5.1 Control of Service Provisions

The civil and geotechnical engineering services provided by Bowser-Morner have *related* applications to service provisions. As defined in the project's scope of work (SOW), Bowser-Morner's services are quite often used in the construction of a structure (*i.e. a dam, landfill, building, etc*). Service provisions are supplied as part of Bowser-Morner's report in the form of construction specifications and performance criteria. Control of these specifications and demonstrable performance criteria is part of the design and development process (*Section 7.3*) and is subject to the same forms of review and verification.

7.5.2 Validation of Process for Service Provisions

As described in Section 7.3.6, when the customer retains Bowser-Morner for validation services such as field and laboratory testing, these services are "*in-a-form*" validated by the laboratory's accreditation. The American Association of State Highway and Transportation Officials (AASHTO) accredits Bowser-Morner's construction materials field and testing services. Refer to Bowser-Morner's quality system manual QA-020 for details concerning field and laboratory testing.

7.5.3 Identification and Traceability

As stated in Section 7.1, most often, Bowser-Morner's product is a report. When a project (engineering and subsurface) is initiated, a unique project number is assigned. This number is used to identify and track the work and associated documents of the project.

Any samples that are collected as part of the project are also assigned individual identification numbers. As applicable, chain-of-custody practices are used to ensure traceability from sampling to receipt at the laboratory.

After the testing is complete, the samples are retained by the laboratory for a specified period of time and then disposed of unless the submitting department (*engineering or subsurface*) requests otherwise. Samples are disposed of in accordance with the company's waste management and reduction program.

7.5.4 Customer Property

For engineering and subsurface work, customer property typically relates to the job-site. Reasonable care is to be exercised to protect the property when work is being performed on the customer's job-site. The general conditions and expectations for both Bowser-Morner personnel and the customer are defined in the "*Job-Site*" section of Bowser-Morner's standard terms and conditions. Site specific conditions will be defined in the project's SOW.

7.5.5 Preservation of Items

With respect to preservation, the word “item” is equivalent to “sample”. Samples may be collected as part of a civil or geotechnical engineering project, as part of an environmental study, or for quality-related laboratory testing. In each case, the proper means of identifying, handling, preserving, and storing the samples is to be decided in the project’s SOW.

7.5.6 Additional Information

The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner Document QA-020, *Quality System Manual for Field and Laboratory Services*
- Bowser-Morner Document, *Waste Management and Reduction Manual*

7.6 Control of Monitoring and Measuring Devices

7.6.1 General

For Bowser-Morner's engineering and subsurface work, monitoring and measuring devices are typically associated with the collection of samples and/or the determination of test results (*refer to Bowser-Morner's quality system manual QA-020 for details concerning the control of laboratory test equipment*). The department manager or technical designee is responsible for the proper selection and use of sampling and measuring and testing equipment. Each department is to provide evidence of adequacy for the equipment assigned to them. Typically the quality assurance department assists the department manager in establishing the method(s) used to verify that equipment has the accuracy, stability, and suitability to achieve the desired results with respect to given specifications. The proper selection of equipment goes hand-in-hand with the selection of the proper field sampling and/or testing methods.

The quality assurance department maintains (*through the calibration laboratory*) an inventory of calibratable equipment and measurement standards. This inventory is a listing of sampling, measurement, and test equipment and includes information concerning the manufacture, model, type, and equipment capability. A chronological history of repairs or modifications is maintained either in the equipment's calibration folder or as separate records (*a logbook or maintenance form*).

As applicable, the department manager is responsible to see that the equipment in his or her department is properly calibrated before being *initially* placed into or *returned* to use. If the department manager chooses to use equipment that is outside the ownership or control of the company, he or she is required to see that the equipment is calibrated and functioning properly.

Refer to Bowser-Morner quality assurance SOPs QA-1200 and QA-1210 for more details concerning the control and calibration of sampling, measurement, and test equipment.

7.6.1 Additional Information

The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner SOP QA-1200, *Inventory Control of Measurement and Test Equipment*
- Bowser-Morner SOP QA-1210, *Measuring and Test Equipment (M&TE) Calibration*

SECTION 8 – MEASURE, ANALYZE, IMPROVE

8.1 General

Bowser-Morner has established and maintains several programs for the monitoring, measurement, analysis, and improvement of the company's services. These programs include, as applicable, the use of statistical techniques in the measurement and analysis processes. The following are key programs for measurement, analysis, and improvement:

Program	Reference	Measurement
Policies & Procedures	4.2.5	Bar charts measure documents completed vs. goals (%)
Customer Complaints	7.2.3	Bar charts measure number & areas of complaints
Customer Satisfaction	8.2.1	Customer satisfaction index (%) & six sigma rating
Internal Audits	8.2.2	Bar charts measure number & areas of deficiencies
Nonconformance	8.3	Bar charts measure number & areas of nonconformance
Improvement Goals	5.6.3	Completion of annual improvement goals (%)
Safety	6.2.3	Charts & stats. monitor accidents vs. hours worked
Productivity/Profitability	5.4.3	Charts & stats. monitor ANF, profit, hours worked, etc.

8.1.1 Additional Information

The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner SOP QA-0240, *Measuring Customer Satisfaction*
- Bowser-Morner SOP QA-0270, *Review by Management*
- Bowser-Morner SOP QA-1000, *Developing Bowser-Morner Technical Standard Operating Procedures (SOPs)*
- Bowser-Morner SOP QA-1300, *Nonconformance Requiring Corrective Action*
- Bowser-Morner SOP QA-1705, *Internal Quality Audit to the Requirements of QA-040 (Engineering and Subsurface Exploration)*

8.2 Monitoring and Measurement

8.2.1 Customer Satisfaction

Bowser-Morner has established and actively maintains a system for measuring, evaluating, and acting in response to quality-related customer opinions concerning the services provided by Bowser-Morner. A mailed survey card, faxed survey sheet, or emailed survey form allows the customer to rate the department on responsiveness, helpfulness and courtesy, quality and accuracy of report, and overall value of service.

Copies of the returned cards and surveys are distributed to the company president and the appropriate department manager with the original going to the quality assurance manager. A customer rating of *fair* or *poor* triggers a corrective action response from the quality assurance manager to the department manager whom in turn contacts the customer to discuss their concerns. The quality assurance department maintains and distributes to management a quarterly customer satisfaction index report. Refer to Bowser-Morner Quality Assurance SOP QA-0240 for more details concerning customer satisfaction.

8.2.2 Audits and Assessments

An audit of each department is to be conducted at least yearly, on a scheduled basis, to verify compliance with the company's quality management system. In addition, audits may be conducted as part of a corrective action response to confirm that measures have been taken to preclude the recurrence of a problem.

One or more auditors, who do not have direct responsibility in the department being audited, conduct the audit. For engineering services, an audit team may consist of a senior level engineer from another department and the quality assurance manager. For the subsurface exploration department, the quality assurance manager will conduct the audit.

Audit results are recorded and noted per distribution to management personnel for review and response to any found deficiencies. A vital part of the internal audit includes a review of corrective action reports and verification that corrective actions are being properly implemented and maintained.

Bowser-Morner's quality assurance SOP QA-1705 details the internal audit process.

Response to Deficiencies

Addressing audit deficiencies is the responsibility of the department manager with results documented and retained by the quality assurance manager. The response is typically in the form of a Bowser-Morner Deficiency Response form and/or an interoffice memo from the department manager to the quality assurance manager that outlines the implemented corrective action plan.

Review and Approval

The last page of the audit report includes lines for the signature of the following individuals: auditor(s), department manager, and company president. The signature of each individual indicates a review of the audit findings and their agreement to any corrective actions that have been implemented to preclude recurrence of identified deficiencies.

If deemed necessary by any one of the signatories, a follow-up audit can be scheduled and conducted. The quality assurance manager typically conducts follow-up audits.

Any deficiencies found as a result of the follow-up, either from incomplete implementation of corrective actions or as the result of ineffective corrective actions, are handled by integration into the company's regular corrective action process. The findings and actions of a follow-up audit should be documented and included as part of the original audit report.

8.2.3 Safety

The company's safety committee, which is chaired by the safety and facilities manager, monitors *recordable* incidents related to on-the-job employee safety. This information is measured and recorded in a number of ways including recordable incident rate, incidents per department/type of service, and type of incident. Employee safety and health is considered as a separate program and only *touched on* in this quality management system manual.

8.2.4 Productivity/Profitability

The company's chief financial officer prepares a monthly financial operation report for each department and distributes this report to appropriate management personnel. This report contains current time period and year-to-date financial results and compares the current information with the past year's financial performance. Department managers use tables and charts to compare their department's financial performance to departmental budgets. The planning, monitoring, and control of the company's productivity and profitability is considered as a separate program and only *touched on* in this quality management system manual.

8.2.5 Monitoring and Measurement Processes

Bowser-Morner applies suitable methods for monitoring and, where applicable, measurement of the quality management system processes. These methods demonstrate the ability of the processes to achieve planned results and document the company's progress through internal quality system audits (*Section 8.2.2*) and annual reports to management (*Section 5.6.3*).

8.2.6 Monitoring and Measurement of Services

As the provider of a service, Bowser-Morner's deliverables is typically in the form of:

Engineering Services

- Reports
- Drawings
- Specifications
- Work Plans
- Expert Opinions
- Technical Oversight
- Project Management

Subsurface Exploration Services

- Boring logs
- Monitoring Well Installation
- Sample Collection

The closest that Bowser-Morner gets to producing a tangible product would be the installation of a monitoring well or the recovery of a subsurface sample such as soil or aggregate.

In relation to the company's quality policy (*Meeting or exceeding the requirements of our customers*), the monitoring of customer satisfaction (*Section 8.2.1*), customer complaints (*Section 7.2.3*), and customer retention (*Section 8.4.3*) are the principle sources of external measurement for evaluating a *quality* service.

Internally, close monitoring of the project's scope of work, project changes during work, and final verification of designs, reports, drawings, etc. are the most effective means of producing a *quality* service. Design and development verification (*Section 7.3.5*) by an experienced senior staff member is one of the most significant activities contributing to quality control and quality improvement.

8.2.7 Additional Information

The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner SOP QA-0240, *Measuring Customer Satisfaction by Survey*
- Bowser-Morner SOP QA-1705, *Internal Quality Audit to the Requirements of QA-040 (Engineering and Subsurface Exploration)*

8.3 Control of Nonconforming Service

8.3.1 Identification of Nonconformance

The identification of nonconformance may involve procured items and services, laboratory and field work, the results of such work, and audit findings. Possible sources of nonconformance include: purchased chemicals and test equipment, samples collected and submitted for testing, field logs, reports that do not meet the customer's needs, and audits conducted to evaluate a department's compliance with the quality management system and technical operations. In each case the possibility arises for the identification of nonconformance.

Refer to Bowser-Morner quality assurance SOP QA-1300 for more details concerning the identification of nonconformance.

8.3.2 Handling of Nonconformance

Any employee identifying a possible problem involving company work is to report the finding to a department manager or the quality assurance manager. If the finding is determined to be a nonconformance to the company's quality management system or technical operations, the responsibility for promptly handling the nonconformance lies with the department manager and the quality assurance manager. Both individuals have the authority to investigate the problem and implement corrective actions. The documenting of a nonconformance is to be integrated into the corrective action process (*Section 8.5.3*).

8.3.3 Customer Notification

If one or more organizations (*typically customers*) have been affected by the nonconformance, they are to be notified as soon as possible. The affected organization(s) is to be listed on the C.A.R. form along with how they were notified and the date of notification.

8.3.4 Additional Information

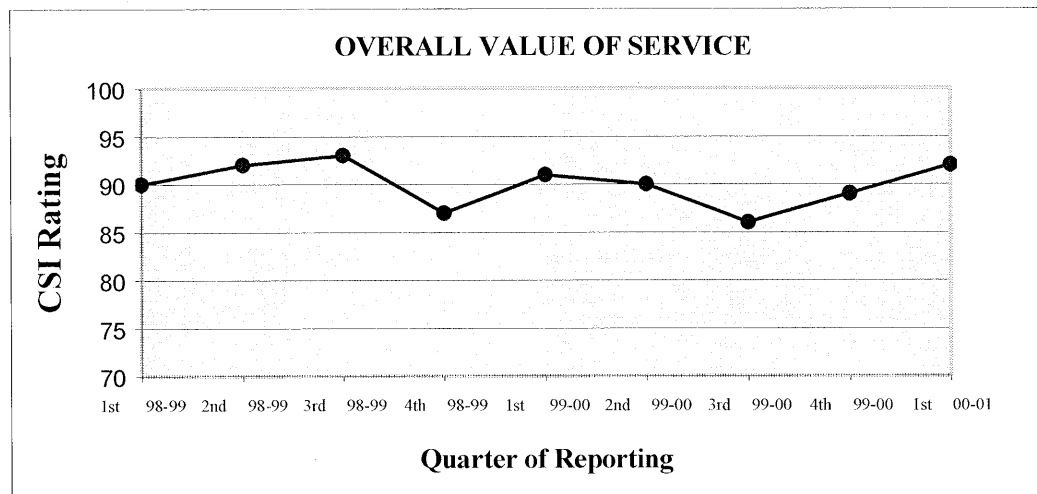
The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner SOP QA-0810, *Purchased Products and Services – Supplier Nonconformance*
- Bowser-Morner SOP QA-1300, *Nonconformance Requiring Corrective Action*
- Bowser-Morner SOP QA-1400, *Corrective Action Response (C.A.R.)*

8.4 Analysis of Data

8.4.1 Customer Satisfaction

Information from customer satisfaction surveys (*Section 8.2.1*) is reviewed as soon as it is received. Any *less-than-acceptable* ratings are to be acted upon by contacting the customer. Every three months, the data generated by this ongoing survey program is compiled and analyzed. The survey results are expressed as both a customer satisfaction index and as a six-sigma rating. By department, the data for each of the four categories (*responsiveness, helpfulness, quality of report, and overall service value*) are displayed as *p*-charts that help identify possible trends.



8.4.2 Customer Complaints

Customer complaints are analyzed by category and number of occurrences per year. The results are displayed as a bar chart and reported as part of the company's annual Quality Report to Management. Customer complaints are also handled by integration into the company's corrective action response program.

Area of Dissatisfaction	Number of Occurrences								
	1	2	3	4	5	6	7	8	9
Responsiveness									
Quality & Accuracy of Report									
Overall Value of Services									
Helpfulness & Courtesy of Staff									

8.4.3 Customer Retention

The company's success at retaining customers over an extended period of time (*i.e. repeat work*) is monitored, measured and reported to management in an annual Sales & Marketing Report. For a five year window, customers are listed as Top Twenty and Clients Representing 80% of annual fees. This allows each department manager to analyze which customers consistently send work to Bowser-Morner. This information is fundamental to the company's annual strategic planning.

8.4.4 Additional Information

The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner SOP QA-0240, *Measuring Customer Satisfaction by Survey*
- Bowser-Morner SOP QA-1900, *Handling Technical Complaints from Customers and Other Parties*
- Bowser-Morner SOP QA-1910, *Handling Non-Technical Complaints from Customers and Other Parties*

8.5 Improvement

8.5.1 Continual Improvement

Bowser-Morner works to continually improve on the effectiveness of its quality management system and the services we provide to our customers. Key components of this continual improvement process are:

- a) Measurement and analysis of quality objectives (*Section 4.2.1*)
- b) Strategic planning and management review practices (*Section 5.4.3*)
- c) Customer focus (*Section 5.2.1*)
- c) Professional development (*Section 6.2.2*)
- d) Root cause analysis of nonconformance and effective implementation of corrective actions (*Section 8.5.2*)
- e) Preventative actions (*Section 8.5.3*)

8.5.2 Corrective Action

Bowser-Morner's corrective action response (C.A.R.) program covers processes and operations, equipment, report errors and invalid results, audit findings, and customer complaints. This corrective action system is used to track and document the investigations and corrective actions dealing with nonconformance.

A corrective action response can be initiated by a department manager or above. A standardized form, controlled by the quality assurance manager, is used to document the investigation, corrective action, and subsequent monitoring.

When conditions that are adverse to quality are identified, the problem is to be corrected as soon as practical. In the case of conditions *significantly* adverse to quality, the problem is to be identified as a nonconformance (*Section 8.3*), the root cause(s) determined, and corrective action taken to preclude recurrence. If the condition is found to have affected Bowser-Morner's service to the customer, the department manager is to notify the affected customer of the situation, so that the customer may take appropriate action.

When the investigation and corrective action is complete, the original C.A.R. form is signed and dated by the responsible department manager and forwarded to the quality assurance department. The quality assurance manager then monitors and verifies the implementation of any corrective action. When the quality assurance manager is satisfied of the corrective action's effectiveness, he or she signs and dates the C.A.R. form to close the corrective action process.

Refer to Bowser-Morner quality assurance SOP QA-1400 for more details concerning the corrective action process.

Cause Analysis

When a nonconformance has been identified and a C.A.R. has been issued, an investigation is to be conducted to gather data and information that can be used in the development of a corrective action plan. The investigation into the root cause(s) of the nonconformance is typically the responsibility of the department manager or a designee with knowledge of the problem and any technical issues. Consider the following sources of information when investigating a nonconformance:

- a) Review the agreed upon scope of work and any subsequent changes after work had begun.
- b) Interview staff members who were involved in the work process.
- c) Review the processes, procedures, and equipment used.
- d) Check reference documents containing technical data and calculations.

Based on the findings of the investigation, the investigating person should be able to identify the cause for the nonconformance. There may be many possible causes but among these causes there is typically one dominant *root cause*. An accurate identification of the root cause will allow for a more complete and functional corrective action. For assistance in conducting a root cause analysis, refer to Bowser-Morner SOP QA-1400.

8.5.3 Preventive Action

One form of preventative action is to stay current with the standards and regulations of the industries that we serve. Bowser-Morner works to stay current with changes to engineering practices and subsurface exploration procedures by participation on professional societies, subscriptions to relevant publications, and through our professional development programs.

For company policies and standard operations, Bowser-Morner develops its own procedures. These include human resources policies and procedures, a chemical hygiene plan, project safety plans, and various other policies addressing professional development, project management, and customer relationships.

When the absence of a published procedure and/or a consensus standard could jeopardize the quality of a department's technical work, the department manager may choose to develop an in-house standard operating procedure (SOP). These documented SOPs are reviewed and revised on an "as-needed" basis to remain current with the industry practices that they are typically derived from, changes in equipment, and in-house developed improvements. Refer to Bowser-Morner quality assurance SOP QA-1000 for more details concerning the development of in-house technical procedures and specifications.

External Peer Review

At times, Bowser-Morner finds it beneficial to participate in an audit/review process conducted by a government agency or other independent organization. One such organization that has been used by Bowser-Morner is ASFE, the Association for Engineering Firms Practicing in the Geosciences. Participation in ASFE's Peer Review Program is handled in the same manner as other audits including addressing peer review findings through the company's corrective action process.

8.5.4 Additional Information

The following documents contain text that is relevant to the policies and procedures covered in this section of quality system manual QA-040.

- Bowser-Morner SOP QA-1000, *Developing Bowser-Morner Technical Procedures and Specifications*
- Bowser-Morner SOP QA-1400, *Corrective Action Response (C.A.R.)*

Appendix A

Organization Chart

Organizational charts for the company and the various departments are available in a public services folder located on the company's server at:

Dayton sv1

BMI_Public

QA Services

Organization & Description

Organizational Charts

Appendix B

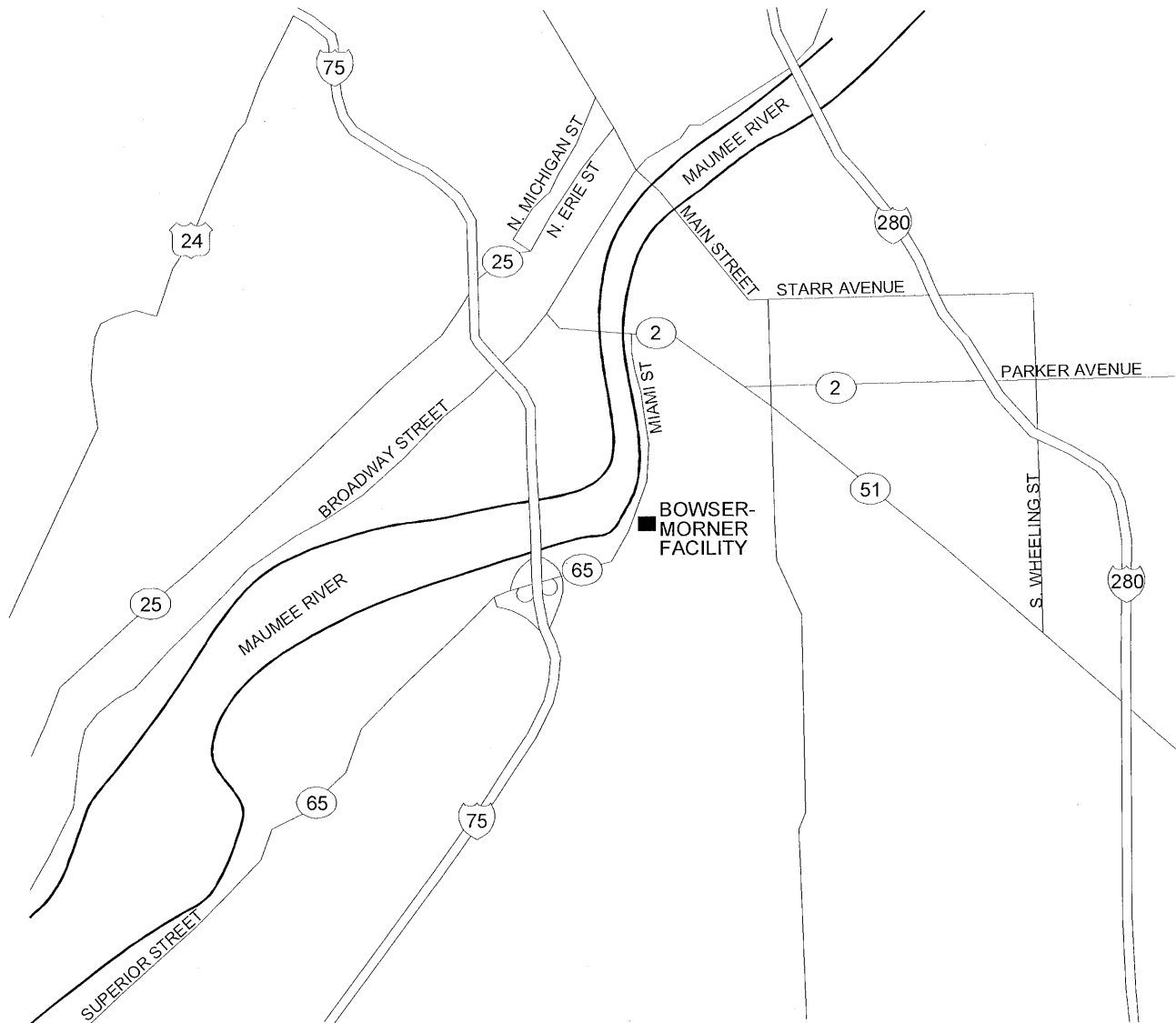
Location Maps



DAYTON, OHIO LOCATION AREA MAP

Appendix B

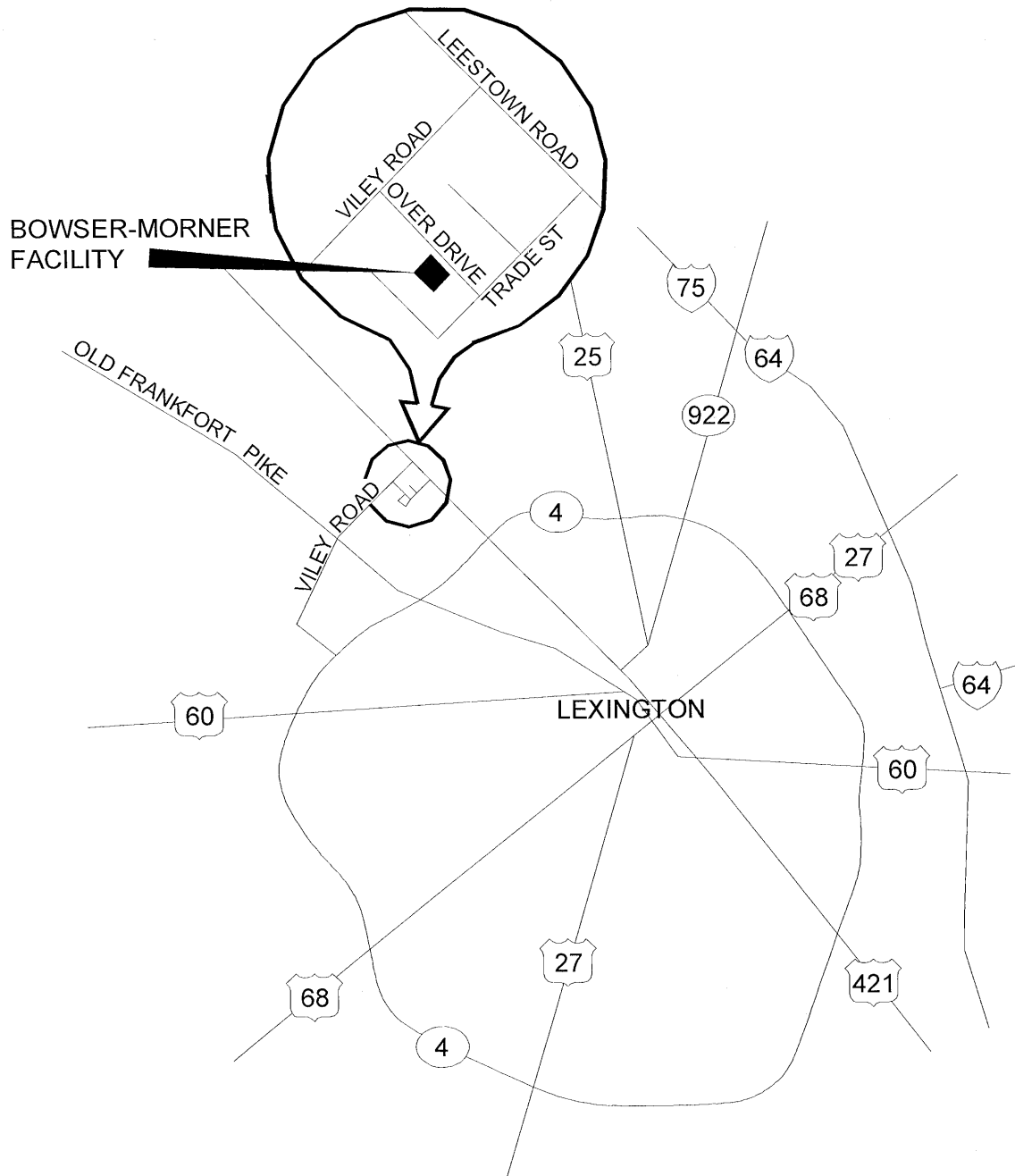
Location Maps



TOLEDO, OHIO LOCATION AREA MAP

Appendix B

Location Maps



LEXINGTON, KENUTCKY LOCATION AREA MAP

Appendix C

Comparison of Quality Management System QA-040 To:

ISO 9001:2008

ISO 9001:2008	QA-040	Support Documents
4. Quality Management Requirements <i>(title only)</i>		
4.1 General Requirements	4.1	QA-0210, QA-0710
a) Identify the processes needed for the QM system	4.1.1, 4.1.2	
b) Determine the sequence of these processes	4.1.1	
c) Determine criteria and methods needed	4.1.1	
d) Ensure availability of resources and information	4.1.1, 4.1.3	
e) Monitor, measure and analyze these processes	4.1.1	
a) Implement actions to achieve planned results	4.1.1	
4.2 Document Requirements	4.2	QA-0210
4.2.1 General	4.2.1, 4.2.5	
a) Quality policy and quality objectives	4.2.1	
b) A quality manual	4.2.1	
c) Documented procedures	4.2.1	
d) Documents needed to ensure effective processes	4.2.1	
e) Records required by this standard	4.2.1	
4.2.2 Quality Manual	4.2.2	
a) Scope of the QM system	4.2.2	
b) Documented QM system procedures <i>(or refer to)</i>	4.2.2	
c) Description of interaction between QM processes	4.2.2	
4.2.3 Control of Documents	4.2.3	QA-0230
a) Approve documents prior to issue	4.2.3	
b) Review and update documents	4.2.3	
c) Ensure that current revisions are identified	4.2.3	
d) Ensure that relevant revisions are available	4.2.3	
e) Ensure that documents are legal and identifiable	4.2.3	
f) Ensure that external documents are identified	4.2.3	
g) Prevent the unintended use of obsolete documents	4.2.3	
4.2.4 Control of Records	4.2.4	QA-1610, 900-003, 900-020
5. Management Responsibility <i>(title only)</i>		
5.1 Management Commitment	5.1	HR P&P, QA-0110
a) Communicate importance of quality & improvement	5.1.1	
b) Establish quality policy	5.1.1	
c) Ensure quality objectives	5.1.1	
d) Conduct management review	5.1.1	
e) Ensure availability of resources	5.1.1	
5.2 Customer Focus	5.2	HR P&P, QA-0240
5.3 Quality Policy	5.3	HR P&P
a) Appropriate to the purpose of the organization	5.3.1	
b) Commitment to quality & improvement	5.3.1	
c) Provide framework for quality objectives	5.3.1	
d) Communicate quality policy to organization	5.3.1	
e) Review for continuing stability	5.3.1	
5.4 Planning	5.4	QA-0270
5.4.1 Quality Objectives	5.4.1	
5.4.2 Quality Management System Planning	5.4.2	
a) Planning is carried out to meet requirements	5.4.2	
b) Integrity of QM system is maintained	5.4.2	

ISO 9001:2008 (continued)

ISO 9001:2008	QA-040	Support Documents
5.5 Responsibility, Authority, and Communications	5.5	QA-0300, Org. Chart
5.5.1 Responsibility and Authority	5.5.1	
5.5.2 Management Representative	5.5.2	
a) Ensure processes needed for QM system	5.5.2	
b) Report to top management on performance	5.5.2	
c) Promote awareness of customer requirements	5.5.2	
5.5.3 Internal Communication	5.5.3	
5.6 Management Review	5.6	QA-0270, QA-1705
5.6.1 General	5.6.1	
5.6.2 Review Input	5.6.2	
a) Results of Audits	5.6.2	
b) Customer feedback	5.6.2	
c) Process performance & product conformity	5.6.2	
d) Status of preventive & corrective actions	5.6.2	
e) Follow-up action from management reviews	5.6.2	
f) Information about changes that could affect quality	5.6.2	
g) Recommendations for improvement	5.6.2	
5.6.3 Review Output	5.6.3	
a) Improvement of QM system & processes	5.6.3	
b) Improvement of product	5.6.3	
c) Decisions and actions related to resources needed	5.6.3	
6. Resource Management (title only)		
6.1 Provision of Resources	6.1	HR P&P, QA-0710
a) Resources for QM system & improvement	6.1	
b) Resources needed for customer satisfaction	6.1	
6.2 Human Resources	6.2	QA-1800, QA-1810
6.2.1 General	6.2.1	
6.2.2 Competence, Awareness, and Training	6.2.2	
a) Necessary competency for personnel	6.2.2	
b) Provide training	6.2.2	
c) Evaluate effectiveness of training	6.2.2	
d) Personnel aware of the importance of their actions	6.2.2	
e) Appropriate records of education, training, skills	6.2.2	
6.3 Infrastructure	6.3	BM Employee Guide
a) Buildings, workspace, utilities	6.3.1	
b) Process equipment	6.3.1	
c) Supporting services	6.3.1	
6.4 Work Environment	6.4	Safety Policies & Procedures
7. Product Realization (title only)		
7.1 Planning of Product Realization	7.1	QA-0210
a) Quality objectives for products	7.1.1	
b) Establish processes, documents, resources	7.1.1	
c) Require verification, validation, monitoring	7.1.1	
d) Records of that product meets requirements	7.1.1	
7.2 Customer-Related Processes	7.2	QA-1400, QA-1900, QA1910
7.2.1 Determination of Requirements Related to Product	7.2.1	
a) Determine requirements of customer	7.2.1	
b) Requirements not stated but necessary	7.2.1	
c) Statutory & regulatory requirements	7.2.1	
d) Any additional requirements	7.2.1	
7.2.2 Review of Requirements Related to Product	7.2.2	
a) Product requirements are defined	7.2.2	
b) Requirement differences are resolved	7.2.2	
c) Organization has ability to meet requirements	7.2.2	

ISO 9001:2008 (continued)

ISO 9001:2008	QA-040	Support Documents
7.2.3 Customer Communication	7.2.3	QA-1900, QA-1910
a) Product information	7.2.3	
b) Inquiries, contracts or order handling	7.2.3	
c) Customer feedback, including complaints	7.2.3	
7.3 Design and Development	7.3	QA-0230, QA -1610
7.3.1 Design and Development Planning	7.3.1	
a) Determine the design and development stages	7.3.1	
b) Review, verification, validation needed	7.3.1	
c) Responsibility/authority for design & development	7.3.1	
7.3.2 Design and Development Inputs	7.3.2	QA-0400
a) Function and performance requirements	7.3.2	
b) Applicable statutory and regulatory requirements	7.3.2	
c) Information derived from previous designs	7.3.2	
d) Other requirements essential to design	7.3.2	
7.3.3 Design and Development Outputs	7.3.3	QSM Manual QA-020
a) Meet the input requirements	7.3.3	
b) Information for purchasing, production, service	7.3.3	
c) Contains product acceptance criteria	7.3.3	
d) Characteristics that are essential for safety	7.3.3	
7.3.4 Design and Development Review	7.3.4	
a) Evaluate results to meet requirements	7.3.4	
b) Identify any problems & propose actions	7.3.4	
7.3.5 Design and Development Verification	7.3.5	
7.3.6 Design and Development Validation	7.3.6	
7.3.7 Control of Design and Development Changes	7.3.7	
7.4 Purchasing	7.4	QA-0700, QA-0710, QA-0810
7.4.1 Purchasing Process	7.4.1	
7.4.2 Purchasing Information	7.4.2	
a) Requirements for approval	7.4.2	
b) Requirements for qualification of personnel	7.4.2	
c) QM system requirements	7.4.2	
7.4.3 Verification of Purchased Product	7.4.3	
7.5 Production and Service Provision	7.5	QSM Manual QA-020
7.5.1 Control of Production and Service Provision	7.5.1	
a) Information on characteristics of the product	7.5.1	
b) Work instructions	7.5.1	
c) Use of suitable equipment	7.5.1	
d) Use of monitoring & measuring devices	7.5.1	
e) Implementation of M & M devices	7.5.1	
f) Release, delivery & post-delivery activities	7.5.1	
7.5.2 Validation of Processes	7.5.2	
a) Defined criteria for review & approval	7.5.2	
b) Approval equipment & personnel	7.5.2	
c) Use of specific methods & procedures	7.5.2	
d) Requirements for records	7.5.2	
e) Revalidation	7.5.2	
7.5.3 Identification and Traceability	7.5.3	
7.5.4 Customer Property	7.5.4	
7.5.5 Preservation of Product	7.5.5	
7.6 Control of Monitoring and Measurement Devices	7.6	QA-1200, QA-1210
a) Equipment shall be calibrated	7.6	
b) Equipment shall be identified	7.6	
c) Equipment shall be safeguarded from adjustment	7.6	
d) Equipment shall be protected from damage	7.6	

ISO 9001:2008 (continued)

ISO 9001:2008	QA-040	Support Documents
8. Measure, Analysis, and Improve (title only)		
8.1 Monitoring and Measurement	8.1	QA-0240, QA-0270, QA-1000
a) Demonstrate conformity of the product	8.1	
b) Ensure conformity of QM system	8.1	
c) Continually improve QM system	8.1	
8.2 Customer-Related Processes	8.2	QA-0240, QA-1705
8.2.1 Customer Satisfaction	8.2.1	
8.2.2 Internal Audits	8.2.2	
8.2.3 Monitoring and Measurement of Processes	8.2.3	
8.2.4 Monitoring and Measurement of Product	8.2.4	
8.3 Control of Nonconforming Product	8.3	QA-0810, QA-1300, QA-1400
a) Take action to eliminate nonconformance	8.3.1	
b) Authorize use, release, acceptance	8.3.1	
c) Taking action to preclude use or application	8.3.1	
8.4 Analysis of Data	8.4	QA-0240, QA-1900, QA-1910
a) Customer satisfaction	8.4	
b) Conformity to product requirements	8.4	
c) Trends of process & preventative actions	8.4	
d) Suppliers	8.4	
8.5 Improvement	8.5	
8.5.1 Continual Improvement	8.5.1	
8.5.2 Corrective Action	8.5.2	QA-1000, QA-1400
a) Review nonconformance	8.5.2	
b) Determine cause	8.5.2	
c) Evaluate the need for action	8.5.2	
d) Determine & implement action	8.5.2	
e) Record results of action taken	8.5.2	
f) Review corrective action taken	8.5.2	
8.5.3 Preventive Action	8.5.3	
a) Determine potential nonconformance	8.5.3	
b) Evaluate need for action	8.5.3	
c) Determine & implement action	8.5.3	
d) Record results of action taken	8.5.3	
e) Review corrective action taken	8.5.3	

Appendix C

Comparison of Quality Management System QA-040 To:

DOE O 414.1 (10 CFR 830.120)

DOE G 414.1-2 (10 CFR 830.120)	QA-040	Support Documents
4.1 Program (title only)		
4.1.1 Introduction	4.1	
a) Documented quality goals & objectives	4.1.1, 4.2.1	QA-0210
b) Documented mission statement	5.3	BM Employee Guide
c) Compliance with consensus standards	1.4	
4.1.2 Responsibilities	4.2	
Quality directive from management	Page IV	
Key quality objectives include:	4.2.1	
a) Establishing task assignments	4.2.1	
b) Identifying lines of communication	4.2.1	Company Org Chart
c) Determining & providing resources & environment	4.2.1	
d) Ensuring employees are trained & capable	4.2.1	
e) Feedback on the effectiveness of planning & work	4.2.1	
f) Improvements are identified & implemented	4.2.1	
4.1.3 Grade Approach	5.4	
Includes planning, scheduling, & resource consideration	5.4.2	QA-0270
Assess application of specific activities (<i>graded approach</i>)	5.4.2	
4.2 Personnel Training and Qualification (title only)		
4.2.1 Introduction	6.2	
Documented training & competency program	6.2.2	QA-1800, QA-1810
4.2.2 Responsibilities	5.1	
Management's commitment of resources for training	5.1.1, 6.1	HR P&P
4.2.3 Qualification of Personnel	6.2	
Documented job descriptions	6.2.2	
Methods for determining competency	6.2.2	
4.2.4 Training	6.2	QA-1800, QA-1810
Training materials	6.2.2	
Instructor requirements	6.2.2	
Training monitored	6.2.2	
Training includes:	6.2.2	
a) Project/task specific training	6.2.2	
b) site/facility specific training	6.2.2	
c) Institutional training	6.2.2	
4.2.5 Training Plans	6.2	
Prepared training plans for managing work	6.2.2	
Continuing training to improve job performance	6.2.2	
Training records are maintained	6.2.2	
4.3 Quality Improvement (title only)		
4.3.1 Introduction	8.5	
Effective QM system:	8.5.1	QA-0270
a) Uses feedback information to improve	8.5.1	
b) Prevents quality problems (<i>preventative actions</i>)	8.5.1	QA-1410
c) Corrects problems as necessary (<i>corrective action</i>)	8.5.1	QA-1400
4.3.2 Identification of Quality Problems	8.5.2	QA-1300
Identifying problem types (<i>root cause analysis</i>)	8.5.2	
Gauging the significance of a problem	8.5.2	
Handling a problem (<i>on-site vs. long-term.</i>)	8.5.2	
Issuance & removal of Stop-Work orders	8.5.2	

DOE O 414.1 (10 CFR 830.120) (continued)

DOE G 414.1-2 (10 CFR 830.120)	QA-040	Support Documents
4.3.3 Resolution of Quality Problems	8.5.2	
Quality problem resolution (<i>C.A.R.</i>)	8.5.2	
Management's involvement	8.5.2	
Tracking of resolution process	8.5.2	
4.3.4 Quality Improvement	8.5	
Planned management process	8.5.3	
Encourage & empower workers (<i>identify problems</i>)	8.5.3	
Sources of quality related information	8.5.3	
4.4 Documents and Records (title only)		
4.4.1 Introduction	4.2	
Documents to develop & control review	4.2.3	QA-0230
4.4.2 Documents	4.2	
Document control (<i>develop, approve, review, change</i>)	4.2.3	QA-0230
4.4.3 Records	4.2	
Record types & forms (<i>paper, electronic, photo, etc.</i>)	4.2.4	
Record management system (<i>retain, protect, retrieve, etc.</i>)	4.2.4	QA-1610
4.5 Work Process (title only)		
4.5.1 Introduction	7.1	
Work as a process	7.1.1	
4.5.2 Work Performance	7.2	
Management ensures:	7.2.1	
a) Customer & data requirements for the work	7.2.1	
b) Acceptance criteria applicable to work	7.2.1	
c) Hazards associated with work	7.2.2	
d) Technical standards applicable to work	7.2.2	
e) Safety, technical, & environmental controls	7.2.2	
Documented work instructions	7.2.1	
Quality of the work is evaluated	7.2.1	
Worker feedback for improvement	7.2.1	
4.5.3 Item Identification and Use Control	7.5	
Identification & control of items	7.5.3	
4.5.4 Item Protection	7.5	
Items protected from damage, loss, deterioration	7.5.5	
4.5.5 Equipment Control	7.6	QA-1200, QA-1210
Proper equipment	7.6	
As applicable, equipment is calibrated	7.6	
4.6 Design (title only)		
4.6.1 Introduction	7.3	
Formal designs are sound engineering/science practices	7.3.2	QA-0400
Design review & verification	7.3.4, 7.3.5	900-035
Safety issues considered	7.3.1, 7.3.2	
4.6.2 Design Input	7.3	
Contractual requirements, design basics, customer needs	7.3.2	QA-0400
4.6.3 Design Process	7.3	
Design input & interfaces	7.3.2	
Computer software validation	7.3.5	900-040
Design analysis	7.3.5	
4.6.4 Design Output	7.3	
Design output documents (<i>drawings, specs, plans, reports</i>)	7.3.3	
Output documents are controlled	7.3.3	
4.6.5 Design Verification	7.3	
Design verification (<i>tech review, peer review, etc.</i>)	7.3.5	900-035
Qualifications for review personnel	7.3.5	

DOE O 414.1 (10 CFR 830.120) (continued)

DOE G 414.1-2 (10 CFR 830.120)	QA-040	Support Documents
4.6.6 Design Changes	7.3	
Control & recording of design changes	7.3.7	
4.6.7 Suspect/Counterfeit Items	7.4	
Inspection of received items	7.4.3	QA-0700
Use of approved suppliers	7.4.1	QA-0710
4.7 Procurement (title only)		
4.7.1 Introduction	7.4	
Procurement process (<i>purchase order requirements</i>)	7.4.1	QA-0700
Documentation	7.4.1	
Approved suppliers	7.4.1	QA-0710
4.7.2 Procurement Documents	7.4	
Use of purchase order	7.4.2	QA-0700
Requirements & critical parameters	7.4.2	
4.7.3 Supplier Qualifications	7.4	
Approval process for suppliers	4.1.3	QA-0710
4.7.4 Supplier Performance Monitoring	7.4	
Periodic monitoring	7.4.3	
4.7.5 Inspection	7.4	
Inspection for received supplies and services	7.4.3	
4.7.6 Supplier Documents	7.3	
Control of supplier documents (<i>reports, drawings, etc.</i>)	7.3.3	
4.7.7 Suspect/Counterfeit Items	NA	
Avoidance & detection procedures	NA	
4.7.8 Procurement of Safety Grade Items	NA	
Special purchasing practices	NA	
4.8 Inspection and Acceptance Testing (title only)		
4.8.1 Introduction	7.3	
Inspections & tests	7.3.5	
4.8.2 Process	7.3	
Inspection & testing should provide for:	7.3.5	
a) Defined processes (<i>review procedures & tests</i>)	7.3.5	
b) Acceptance criteria	7.3.5	
c) Safety issues	7.3.5	Separate Program
d) Qualified personnel	7.3.5	
e) Records of inspections & test results	7.3.5	
f) Control of failed items	7.3.5	
4.8.3 Control of Measurement & Test Equipment	7.6	QA-1200, QA-1210
Calibration & traceability	7.6	
4.9 Management Assessment (title only)		
4.9.1 Introduction	5.6	
Management review (<i>assess goals & performance</i>)	5.6.2	QA-0270
Safety review	8.2.3	Separate Program
4.9.2 Responsibility	5.6	
Responsibilities for reviews	5.6.2	
4.9.3 Process	5.6	
Report to management	5.6.2	
Report on safety	8.2.3	Separate Program
On-site assessments	5.6.2	
4.9.4 Results	5.6	
Documented reports	5.6.3	QA-0270
Problems identified & corrected	5.6.3	

DOE O 414.1 (10 CFR 830.120) (continued)

DOE G 414.1-2 (10 CFR 830.120)		QA-040	Support Documents
4.10 Independent Assessment (title only)			
4.10.1 Introduction	8.2		
Process for independent assessment	8.2.2		QA-1705
4.10.2 Performing Organization	8.3		
Independent individuals, agencies, organizations	8.3.3		QA-1705
4.10.3 Process	8.2		
Type & frequency	8.2.2		
Criteria for assessment	8.2.2		
4.10.4 Results	8.2		QA-0270
Report to management	8.2.2		
Improvement/corrective actions	8.2.2		
Follow-up	8.2.2		

Appendix C

Comparison of Quality Management System QA-040 To:

ASFE QUALITY CONTROL

ASFE	QA-040	Support Documents
Business Management <i>(title only)</i>		
A. Documented Goals & Objectives	4.2, 5.3	
1) State the mission of the firm	5.3.1	BM Employee Guide
2) Communicate mission & objectives to personnel	4.2.1	
3) Firm's responsibilities to clients, employees, public	4.2.1, 5.3.1	
4) Identify profit goals	4.2.1, 5.3.1	
B. Organizational Structure & Position Responsibilities	4.1, 5.5, 6.2	
1) Inform personnel of the firm's org. structure	4.1.1, 5.5.1	Company Org Chart
2) Job descriptions	6.2.2	
3) As applicable, establish adjunct positions	5.5.1	
4) Periodically review & update	4.1.2	
C. Policies & Procedures	4.2	
1) Readily assessable	4.2.3	QA-0230
2) Persons responsible to develop, review, update	4.2.3	QA-0230
D. Ownership Transition	NA	Separate program
1) Determine the firm's market value	NA	
2) Strategies for the firm's continuation	NA	
E. Strategic Plan for the Firm's Future Direction	5.4	
1) Identify strengths, weaknesses, opportunities	5.4.3	
2) Monitor the firm's performance	5.4.3	
3) Review & revise the strategic plan annually	5.4.3	
4) Communicate the plan's goals & responsibilities	5.4.3	
Facilities and Technical Resources <i>(title only)</i>		
A. Satisfactory Work Conditions	6.3, 6.4	HR P&P
1) Standards for space & furniture allocations	6.3.1, 6.4.1	
B. Technical Resources	4.2, 6.1	
1) Identify field and laboratory support needs	6.1	QA-0710
2) System for retrieval of current & prior project records	4.2.4	QA-1610
3) Responsibility for collection, storage, retrieval	4.2.4	
C. Business, Personnel, & Technical Records	4.2, 5.1	
1) Responsibility for protecting important records	4.2.4	
2) Protecting client confidentiality & proprietary data	5.1.4	HR P&P
3) System for retention & purging records	4.2.4	QA-1610
D. Employee Health & Safety Procedures	6.2, 7.5	*
1) Medical monitoring program	6.2.3	Corp. Health & Safety
2) Handling, storage, disposal of hazardous materials	7.5.3	Corp. Health & Safety
3) Personnel protection equipment & instruments	6.2.3	Corp. Health & Safety
Human Resources <i>(title only)</i>		
A. Recruiting & Orientation	6.2	Separate program
1) Responsibility for recruiting	6.2.1	HR P&P
2) Identify sources & qualifications	6.2.1	HR P&P
3) Handling resumes & applications	6.2.1	HR P&P
4) Orientation program	6.2.1	
B. Employment Processes & Records	6.2	Separate program
1) Responsibility for human resources functions	6.2.1	
2) Confidential records system	6.2.1	HR P&P, QA-0110
3) Document training received by staff members	6.2.2	QA-1800

ASFE QUALITY CONTROL (continued)

ASFE	QA-040	Support Documents
4) Equal employment opportunity officer	6.2.1	HR P&P
5) Health & safety manager & programs	6.2.3	HR P&P
6) Substance abuse policies & procedures	6.2.3	HR P&P
C. Training & Career Path Development	6.2	
1) Internal & external training opportunities	6.2.2	QA-1800
2) Assign individuals to appropriate types of work	6.2.2	
3) Announce staff openings to employees	6.2.4	
D. Personnel Positions & Compensations	6.2	
1) Review position descriptions, salary, & benefits	6.2.2	Separate program
E. Personnel's Performance	6.2	
1) Responsibility for performance reviews	6.2.2	QA-1800
2) Review evaluations with the person evaluated	6.2.2	
3) Provide review records to managers	6.2.2	
4) Maintain records of advancements (<i>personnel files</i>)	6.2.2	HR P&P
F. Communications	6.1, 6.2	
1) Performance discussions with personnel	6.2.2	
2) Evaluate & improve HR management	6.2.1	HR P&P
Professional Development (title only)		
A. Professional Development	6.2	
1) Responsibility for professional development	6.2.2	QA-1800
2) Professional training standards (<i>in-house & outside</i>)	6.2.2	
3) Review & update training & development program	6.2.2	
B. Communications	5.5, 6.2	
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2) Support activities in professional organizations	6.2.2	
3) Registration of professional staff	6.2.2	
C. Training Programs & Development Opportunities	6.2	
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2) Training in supervisory/management practices	6.2.2	
3) Upgrade training activities	6.2.2	
D. On-The-Job Training	6.2	
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2) Documented records of experience	6.2.2	
3) Supervision	6.2.2	
E. Risk Awareness	6.2	
1) External training seminars (<i>risk management</i>)	6.2.2	
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F. Advancement	6.2	
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2) Performance criteria	6.2.2	
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A. Client Contracts	7.2, 7.3	
1) Contract provisions	7.2.3, 7.3.2	QA-0400
2) Contract review	7.3.2	QA-0400
B. Budgets & Schedules	7.3	
1) Monitoring progress of projects & corrective actions	7.3.1	
2) Departures from the plan	7.3.7	
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1) Procedures for regular communications with client	7.2.3, 7.3.2	
2) Assessing & managing risk	7.1.1	QA-1400

ASFE QUALITY CONTROL *(continued)*

ASFE	QA-040	Support Documents
D. Confidentiality of Client Information	5.1	
1) Policy for releasing information	5.1.4	HR P&P
2) Release by client permission	5.1.4	
3) Reporting to public agencies <i>(required by law)</i>	5.1.4	
E. Billing & Collection of Fees	7.3	
1) Billing & payment procedures	7.2.3, 7.3.3	Separate program
F. Closure <i>(sample disposal, document return, final invoice)</i>	7.3	
Project Planning and Assigning Personnel <i>(title only)</i>		
G. Project Scheduling	7.1	
H. Assigning Personnel	7.3	
1) Responsibility for selection of personnel	7.3.1	
2) Identify staffing requirements	7.3.1	
3) Supervision	7.3.1	
4) Selection of personnel <i>(quals, training, performance)</i>	7.3.1	
5) Trainees <i>(opportunities for training & experience)</i>	7.3.1	
I. Contract Requirements	7.3	
1) Proposal commitments <i>(specific personnel)</i>	7.3.2	
2) Continuity of work	7.3.1, 7.3.3	
J Site-Specific Health & Safety Plans	7.3	
K. Supervision	7.3	
L. Review Process	7.3	
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3) Work performance	7.3.5	
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O. Pre-engagement Activities	7.3	
P. Project Performance & Review Activities	7.3	
1) Project files <i>(chronological records of activities)</i>	7.3.3	
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Q. Project File Closure	4.2, 7.3	
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2) Form & contents	7.3.3	
3) Storage <i>(safekeeping)</i>	4.2.4, 7.3.3	QA-0230
4) Purging & retiring files	4.2.4	QA-1610
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R. Project Continuity <i>(project continuation - field services)</i>	7.3	
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Financial Management <i>(title only)</i>		
A. Financial Performance <i>(evaluation)</i>	8.4	
B. Budget	5.4	
1) Overhead accounts	5.4.3	
2) Monitoring <i>(financial statements)</i>	5.4.3, 8.2.4	
3) Profitability	5.4.3, 8.2.4	
4) Future workload	5.4.3	
C. Information Systems	7.3	

ASFE QUALITY CONTROL *(continued)*

ASFE	QA-040	Support Documents
D. Invoicing to Clients	7.2	Separate program
E. Accounts Receivable	7.2	Separate program
F. Collection	7.2	
1) Procedures for collection (<i>overdue accounts</i>)	7.2.3	
G. Financial Records (<i>storage & retrieval</i>)	4.2.4	Separate program
Marketing Practices (<i>title only</i>)		
A. Responsibility for Marketing	5.4	Separate program
1) Documents (<i>types, content, language, etc.</i>)	5.4.4	
2) Qualifications (<i>resumes, experience, etc.</i>)	5.4.4	
B. Selection of Clients	5.5, 7.3	
C. Requests & Proposals	5.5, 7.3	
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E. Additional Practices (<i>awards, professional societies, etc.</i>)	5.4.4	

APPENDIX J

**EPA RESPONSE ENGINEERING AND ANALYTICAL CONTRACT
(REAC) SOP# 2082**

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CONSTRUCTION AND INSTALLATION OF PERMANENT SUB-SLAB SOIL GAS WELLS

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- 2.0 METHOD SUMMARY
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- 4.0 INTERFERENCES AND POTENTIAL PROBLEMS
- 5.0 EQUIPMENT/APPARATUS
- 6.0 REAGENTS
- 7.0 PROCEDURES
 - 7.1 Probe Assembly and Installation
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 - 7.3 Repairing a Loose Probe
- 8.0 CALCULATIONS
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CONSTRUCTION AND INSTALLATION OF PERMANENT SUB-SLAB SOIL GAS WELLS

1.0 SCOPE AND APPLICATION

This standard operating procedure (SOP) outlines the procedure used for the construction and installation of permanent sub-slab soil gas wells. The wells are used to sample the gas contained in the interstitial spaces beneath the concrete floor slab of dwellings and other structures.

Soil gas monitoring provides a quick means of detecting volatile organic compounds (VOCs) in the soil subsurface. Using this method, underground VOC contamination can be identified and the source, extent and movement of pollutants can be traced.

2.0 METHOD SUMMARY

Using an electric Hammer Drill or Rotary Hammer, an inner or pilot hole is drilled into the concrete slab to a depth of approximately 2" with the $\frac{3}{8}$ " diameter drill bit. Using the pilot hole as the center, an outer hole is drilled to an approximate depth of 1 $\frac{3}{8}$ " using the 1" diameter drill bit. The 1" diameter drill bit is then replaced with the $\frac{3}{8}$ " drill bit. The pilot hole is drilled through the slab and several inches into the sub-slab material. Once drilling is completed, a stainless steel probe is assembled and inserted into the pre-drilled hole. The probe is mounted flush with the surrounding slab so it will not interfere with pedestrian or vehicular traffic and cemented into place. A length of Teflon[®] tubing is attached to the probe assembly and to a sample container or system.

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING AND STORAGE

3.1 SUMMA[®] Canister Sampling

After the sub-slab soil gas sample is collected, the canister valve is closed, an identification tag is attached to the canister and the canister is transported to a laboratory under chain of custody for analysis. Upon receipt at the laboratory, the data documented on the canister tag is recorded. Sample holding times are compound dependent, but most VOCs can be recovered from the canister under normal conditions near the original concentration for up to 30 days. Refer to REAC SOP #1704, *SUMMA Canister Sampling* for more details.

3.2 Tedlar[®] Bag Sampling

Tedlar[®] bags most commonly used for sampling have a 1-liter volume capacity. After sampling, the Tedlar[®] bags are stored in either a clean cooler or an opaque plastic bag at ambient temperature to prevent photodegradation. It is essential that sample analysis be undertaken within 24 to 48 hours following sample collection since VOCs may escape or become altered. Refer to REAC SOP #2102, *Tedlar[®] Bag Sampling* for more details.

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CONSTRUCTION AND INSTALLATION OF PERMANENT SUB-SLAB SOIL GAS WELLS

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

The thickness of a concrete slab may vary from structure to structure. A structure may also have a single slab where the thickness varies. A slab may contain steel reinforcement (REBAR). Drill bits of various sizes and cutting ability will be required to penetrate slabs of varying thicknesses or those that are steel-reinforced.

5.0 EQUIPMENT/APPARATUS

- Hammer Drill or Rotary Hammer
- Alternating current (AC) extension cord
- AC generator, if AC power is not available on site
- Hammer or Rotary Hammer drill bit, $\frac{3}{8}$ " diameter
- Hammer or Rotary Hammer drill bit, 1" diameter
- Portable vacuum cleaner
- 1 - $\frac{3}{4}$ " open end wrench or 1-medium adjustable wrench
- 2 - $\frac{9}{16}$ " open end wrenches or 2-small adjustable wrenches
- Hex head wrench, $\frac{1}{4}$ "
- Tubing cutter
- Disposable cups, 5 ounce (oz)
- Disposable mixing device (i.e., popsicle stick, tongue depressor, etc.)
- Swagelok® SS-400-7-4 Female Connector, $\frac{1}{4}$ " National Pipe Thread (NPT) to $\frac{1}{4}$ " Swagelok® connector
- Swagelok® SS-400-1-4 Male Connector, $\frac{1}{4}$ " NPT to $\frac{1}{4}$ " Swagelok® connector
- $\frac{1}{4}$ " NPT flush mount hex socket plug, Teflon®-coated
- $\frac{1}{4}$ " outer diameter (OD) stainless steel tubing, pre-cleaned, instrument grade
- $\frac{1}{4}$ " OD Teflon® tubing
- Teflon® thread tape
- $\frac{1}{8}$ " OD stainless steel rod, 12" to 24" length
- Swagelok Tee, optional (SS-400-3-4TMT or SS-400-3-4TTM)

6.0 REAGENTS

- Tap water, for mixing anchoring cement
- Anchoring cement
- Modeling clay

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7.0 PROCEDURES

7.1 Probe Assembly and Installation

1. Drill a $\frac{3}{8}$ " diameter inner or pilot hole to a depth of 2" (Figure 1, Appendix A).
2. Using the $\frac{3}{8}$ " pilot hole as your center, drill a 1" diameter outer hole to a depth of 1 $\frac{3}{8}$ ". Vacuum out any cuttings from the hole (Figure 2, Appendix A).
3. Continue drilling the $\frac{3}{8}$ " inner or pilot hole through the slab and a few inches into the sub-slab material (Figure 3, Appendix A). Vacuum out any cuttings from the outer hole.
4. Determine the length of stainless steel tubing required to reach from the bottom of the outer hole, through the slab and into the open cavity below the slab. To avoid obstruction of the probe tube, ensure that it does not contact the sub-slab material. Using a tube cutter, cut the tubing to the desired length.
5. Attach the measured length (typically 12") of $\frac{1}{4}$ " OD stainless tubing to the female connector (SS-400-7-4) with the Swagelok® nut. Tighten the nut.
6. Insert the $\frac{1}{4}$ " hex socket plug into the female connector. Tighten the plug. **Do not over tighten.** If excessive force is required to remove the plug during the sample set up phase, the probe may break loose from the anchoring cement.
7. Place a small amount of modeling clay around the stainless steel tubing adjacent to the Swagelok® nut, which connects the stainless steel tubing to the female connector. Use a sufficient amount of modeling clay so that the completed probe, when placed in the outer hole, will create a seal between the outer hole and the inner hole. The clay seal will prevent any anchoring cement from flowing into the inner hole during the final step of probe installation.
8. Place the completed probe into the outer hole. The probe tubing should not contact the sub-slab material and the top of the female connector should be flush with the surface of the slab and centered in the outer hole (Figure 4, Appendix A). If the top of the completed probe is not flush with the surface of the slab, due to the outer hole depth being greater than 1 $\frac{3}{8}$ ", additional modeling clay may be placed around the stainless steel tubing adjacent to the Swagelok® nut, which connects the stainless steel tubing to the female connector. Use a sufficient amount of clay to raise the probe until it is flush with the surface of the slab while ensuring that a portion of the clay will still contact and seal the inner hole.

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9. Mix a small amount of the anchoring cement. Fill the space between the probe and the outside of the outer hole. Allow the cement to cure according to manufacturers instructions before sampling.

7.2 Sampling Set-Up

1. Wrap one layer of Teflon® thread tape onto the NPT end of the male connector (SS-400-1-4). Refer to Figure 5, Appendix A.
2. Remove the 1/4" hex socket plug from the female connector (SS-400-7-4). Refer to Section 7.3 if the probe breaks loose from the anchoring cement during this step.
3. To ensure that the well has not been blocked by the collapse of the inner hole below the end of the stainless steel tubing, a stainless steel rod, 1/8" diameter, may be passed through the female connector and the stainless steel tubing. The rod should pass freely to a depth greater than the length of the stainless steel tubing, indicating an open space or loosely packed soil below the end of the stainless steel tubing. Either condition should allow a soil gas sample to be collected.

If the well appears blocked, the stainless steel rod may be used as a ramrod in an attempt to open the well. If the well cannot be opened, the probe should be reinstalled or a new probe installed in an alternate location.

4. Screw and tighten the male connector (SS-400-1-4) into the female connector (SS-400-7-4). **Do not over tighten.** This may cause the probe to break loose from the anchoring cement during this step or when the male connector is removed upon completion of the sampling event. Refer to Section 7.3 if the probe breaks loose from the anchoring cement during this step.
5. If a collocated sub-slab sample or split sample is desired, a stainless steel Swagelok Tee (SS-400-3-4TMT or SS-400-3-4TTM) may be used in place of the Swagelok male connector (SS-400-1-4).
6. Attach a length of 1/4" OD Teflon® tubing to the male connector with a Swagelok® nut. The Teflon® tubing is then connected to the sampling container or system to be used for sample collection.
7. After sample collection remove the male connector from the probe and reinstall the hex socket plug. **Do not over tighten** the hex socket plug. If excessive force is required to remove the plug during the next sampling event the probe may break loose from the

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anchoring cement. Refer to Section 7.3 if the probe breaks loose from the anchoring cement during this step.

7.3 Repairing a Loose Probe

1. If the probe breaks loose from the anchoring cement while removing or installing the hex head plug or the male connector (SS-400-1-4), lift the probe slightly above the surface of the concrete slab.
2. Hold the female connector (SS-400-7-4) with the $\frac{3}{4}$ " open end wrench.
3. Complete the step being taken during which the probe broke loose, following the instructions contained in this SOP (i.e., **Do not over tighten** the hex socket plug or male connector).
4. Push the probe back down into place and reapply the anchoring cement.
5. Modeling clay may be used as a temporary patch to effect a seal around the probe until the anchoring cement can be reapplied.

8.0 CALCULATIONS

This section is not applicable to this SOP.

9.0 QUALITY ASSURANCE/QUALITY CONTROL

An additional collocated soil gas well is installed with the frequency of 10 percent (%) or as specified in the site-specific Quality Assurance Project Plan (QAPP). The following general Quality Assurance (QA) procedures apply:

1. A rough sketch of the area is drawn where the ports are installed with the major areas noted on the sketch. This information may be transferred to graphing software for incorporation into the final deliverable.
2. A global positioning system (GPS) unit may be used to document coordinates outside of a structure as a reference point.
3. Equipment used for the installation of sampling ports should be cleaned by heating, inspected and tested prior to deployment.



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10.0 DATA VALIDATION

This section is not applicable to this SOP.

11.0 HEALTH AND SAFETY

When working with potentially hazardous materials, follow Environmental Protection Agency (EPA), Occupational Safety and Health Administration (OSHA) and Lockheed Martin corporate health and safety procedures. All site activities should be documented in the site-specific health and safety plan (HASP).

12.0 REFERENCES

This section is not applicable to this SOP.

13.0 APPENDICES

A - Figures



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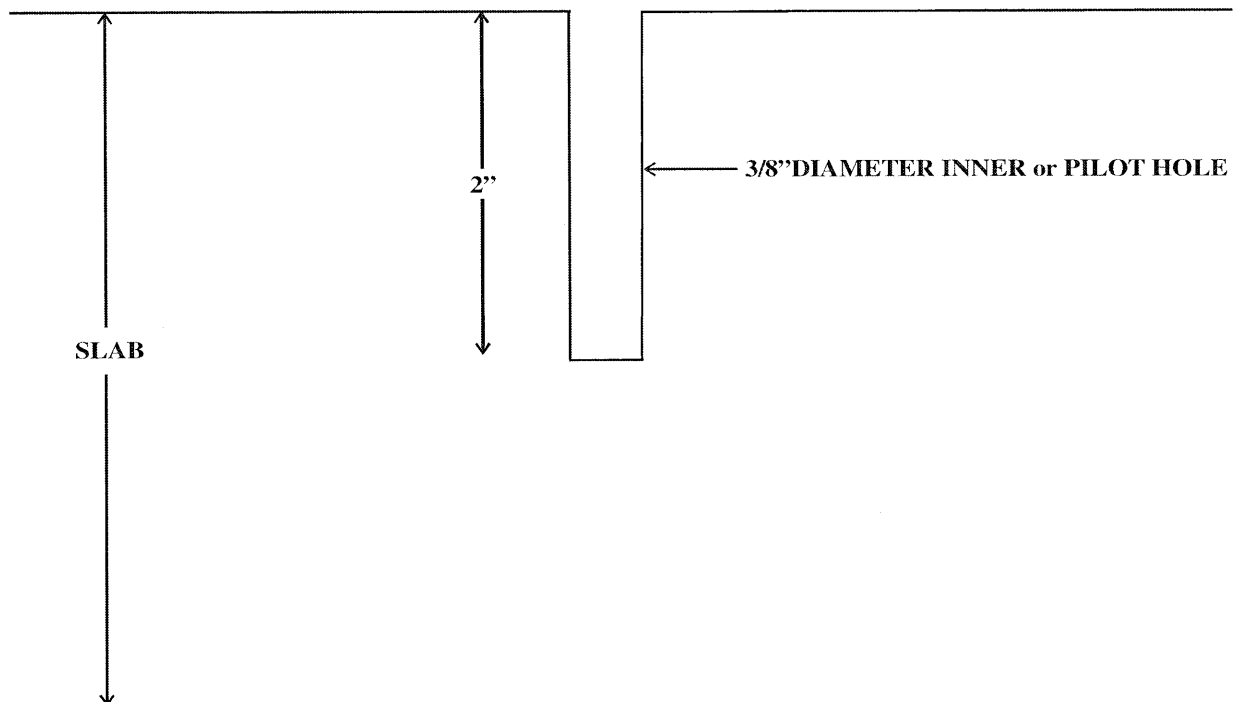
APPENDIX A
Soil Gas Installation Figures
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March 2007

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FIGURE 1
INNER or PILOT HOLE

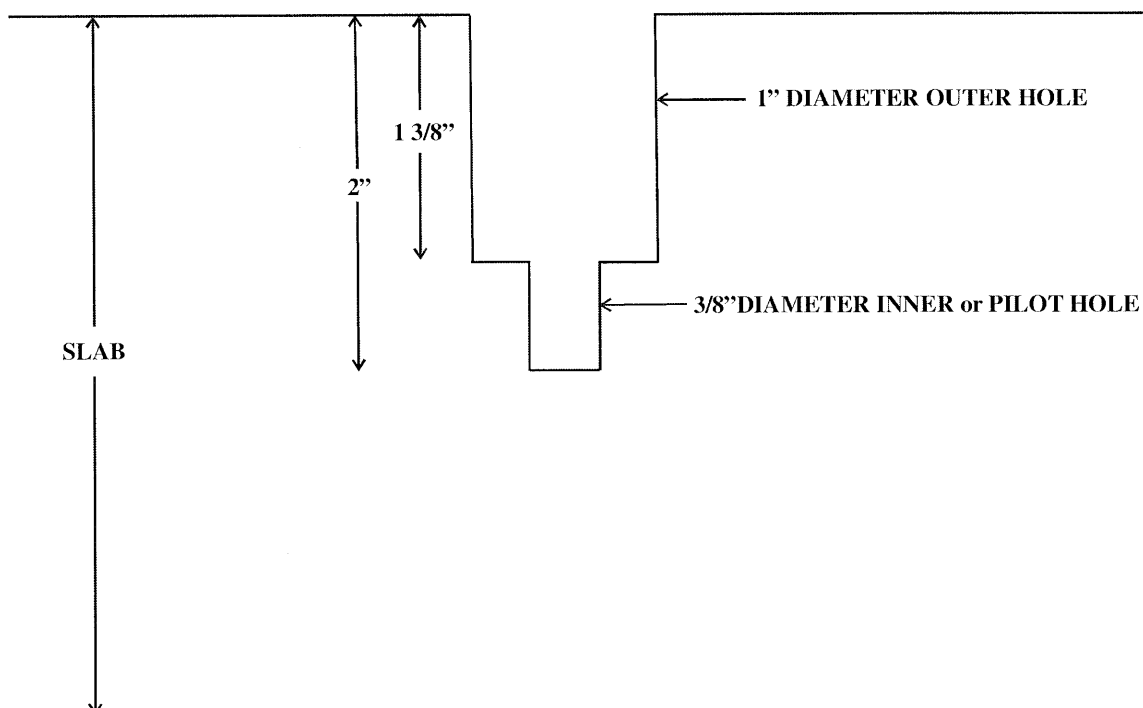


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FIGURE 2
OUTER HOLE

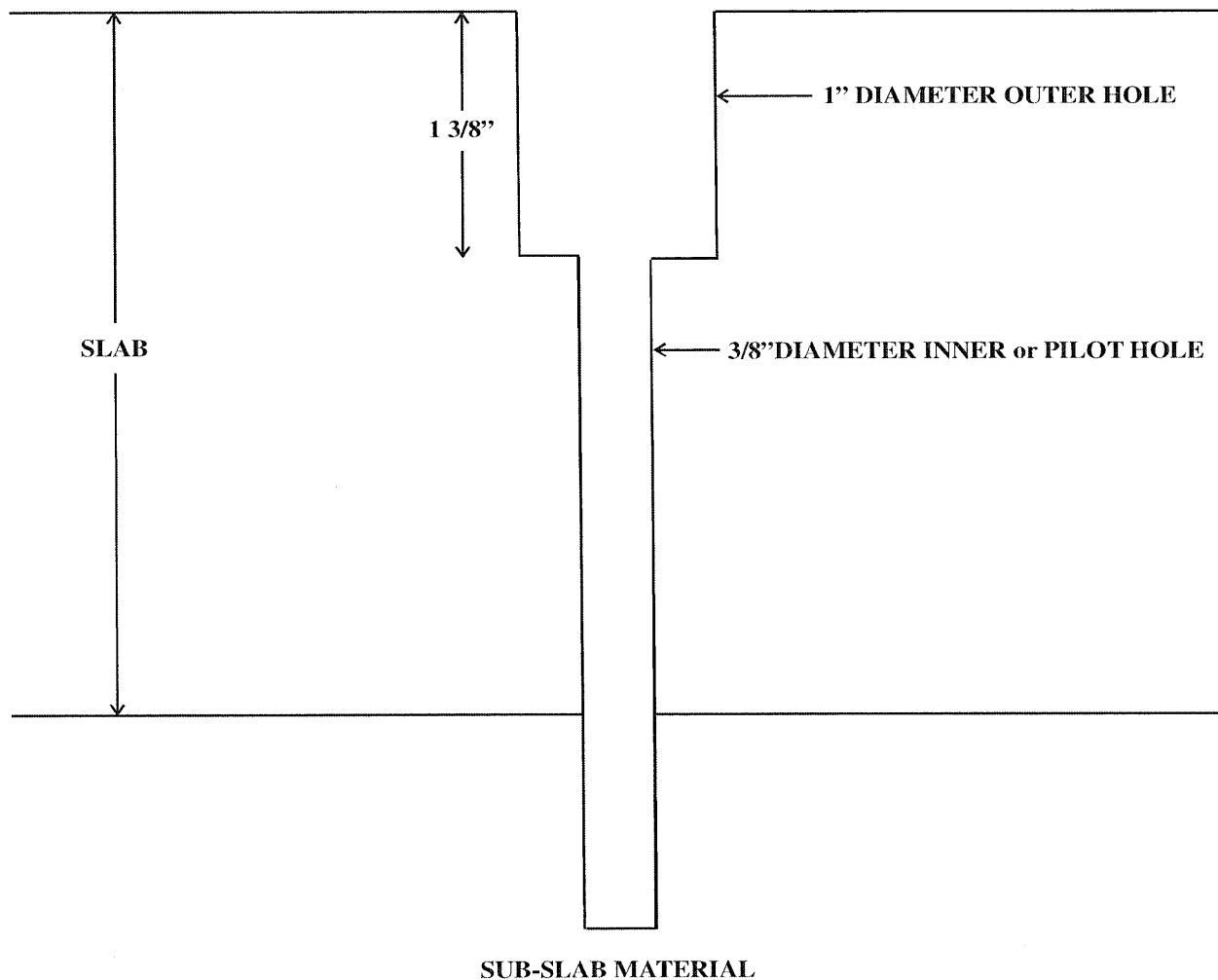


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FIGURE 3
COMPLETED HOLE PRIOR to PROBE INSTALLATION

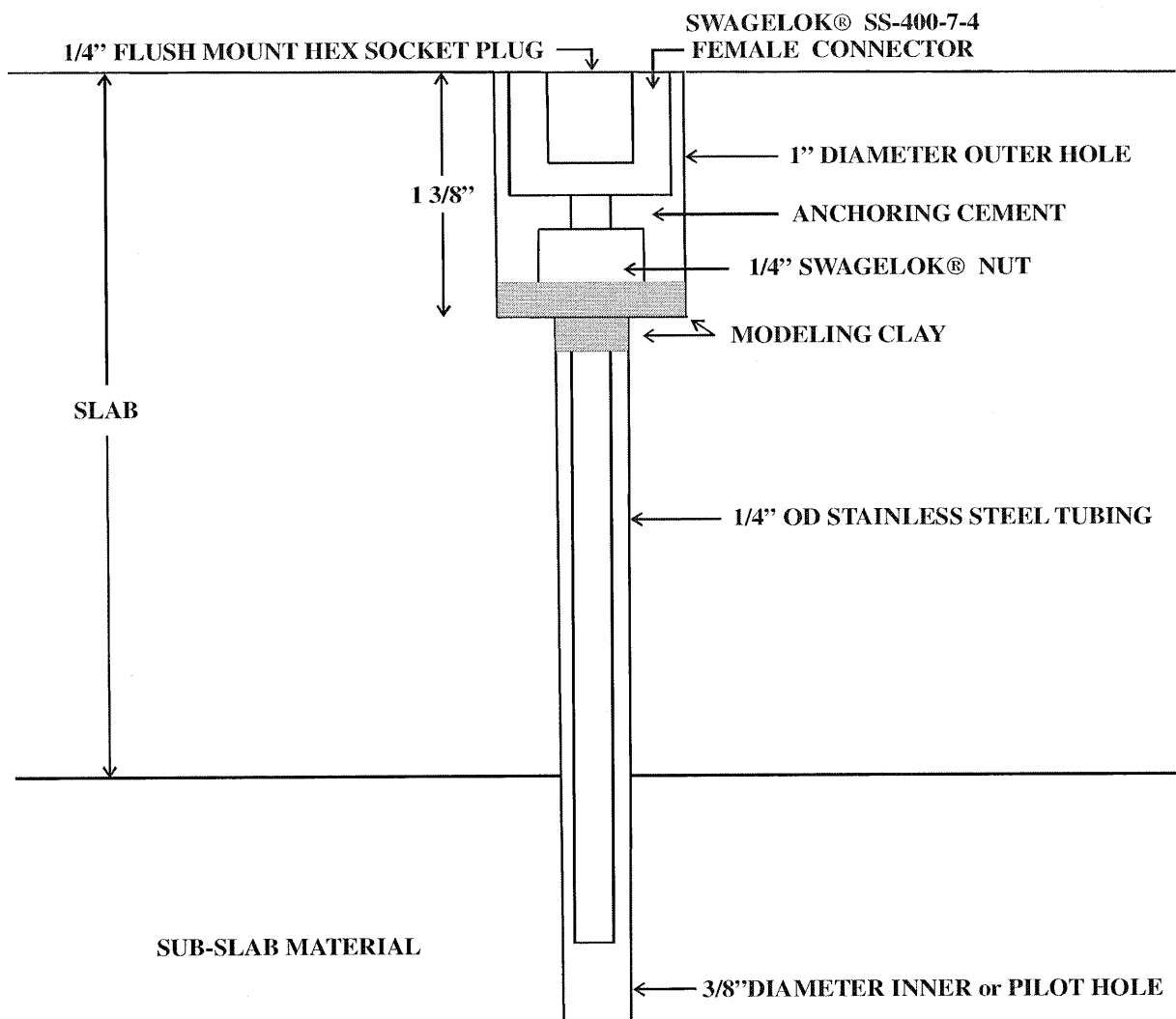


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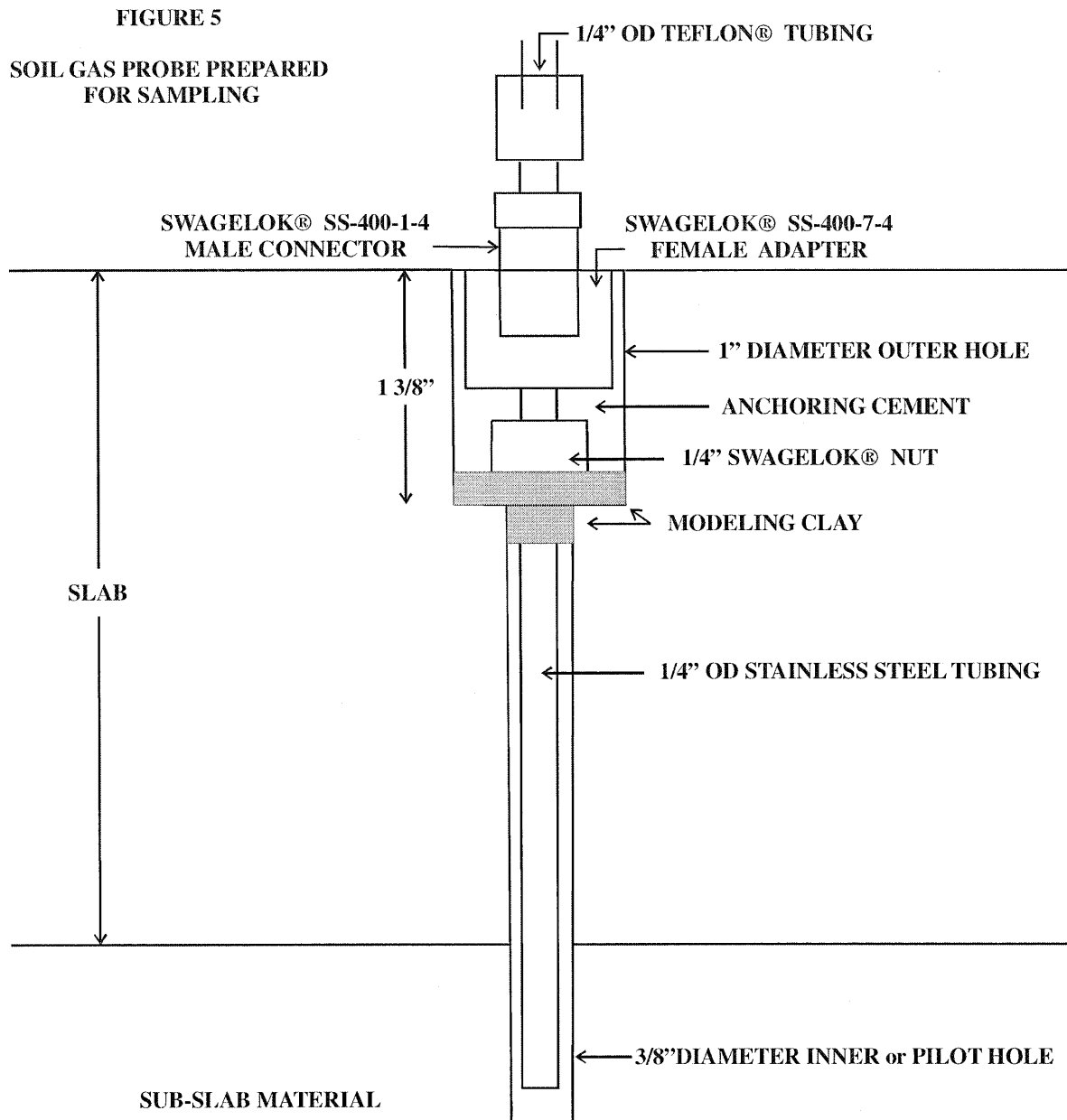
FIGURE 4
SOIL GAS PROBE INSTALLED



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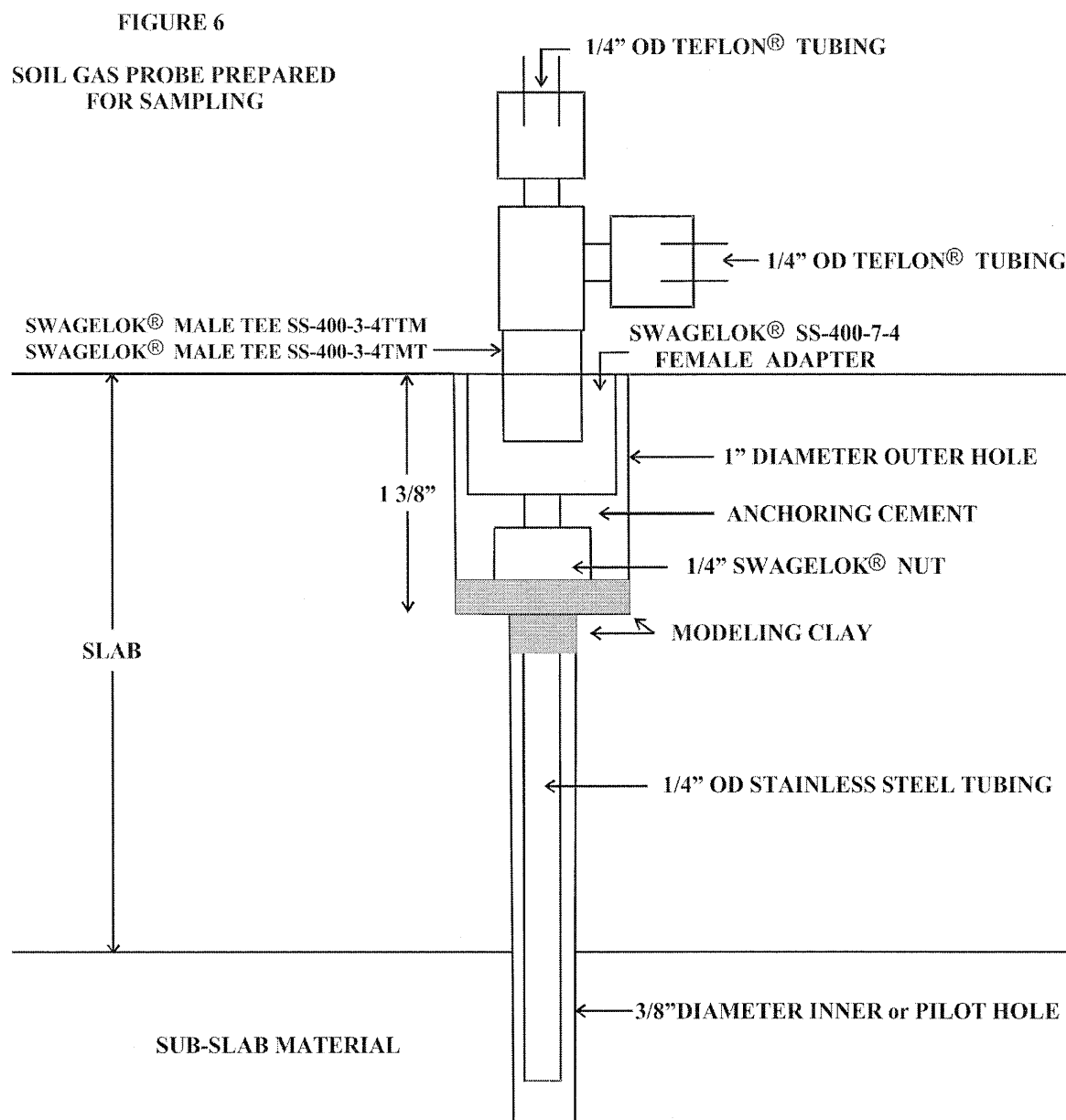
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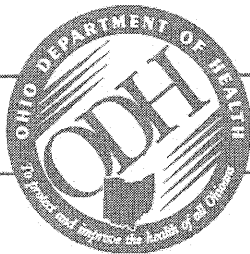
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APPENDIX K

ODH SCREENING LEVELS FOR SDDL SITE (JULY 6, 2012)



OHIO DEPARTMENT OF HEALTH

246 North High Street
Columbus, Ohio 43215

614/466-3543
www.odh.ohio.gov

John R. Kasich / Governor

Theodore E. Wymyslo, M.D. / Director of Health

June 20, 2012

Steven Renninger, On-Scene Coordinator
U.S. Environmental Protection Agency
Emergency Response Branch
26 West Martin Luther King Drive (G41)
Cincinnati, OH 45268

Dear Steve:

Per your request, ODH HAS is providing screening levels for the contaminants of concern in indoor air and sub-slab soil gas for properties at South Dayton Dump in Dayton, Ohio.

The values listed in the tables are expressed in micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) and parts per billion (ppb). We prefer the use of ppb, as we believe it is more easily understood by the general public. Based on the Region 5 guidance, we are giving you both screening levels and action levels for assessing vapor intrusion sites:

Screening Levels are based on 10^{-5} cancer risk or hazard index of 1.0. Screening levels represent concentrations of a substance that are unlikely to cause harmful (adverse) health effects in exposed people. Detections in indoor air below these levels are not of a health concern. When available, our screening levels were taken from ATSDR's minimal risk levels (MRLs) and cancer risk evaluation guides (CREGs). Other sources include the U.S. EPA's reference concentrations (RfCs), regional screening levels (RSLs); and, in the case of cis-1,2-DCE, the 2002 OSWER Vapor Intrusion Guidance.

Action Levels are based on 10^{-4} cancer risk and hazard index of 10. Detections in indoor air that exceed this level would lead to a recommendation for actions to reduce exposure in a relatively short period of time. Detections below the action level, but above the screening level would be referred to the EPA Remedial program or to the state for evaluation.

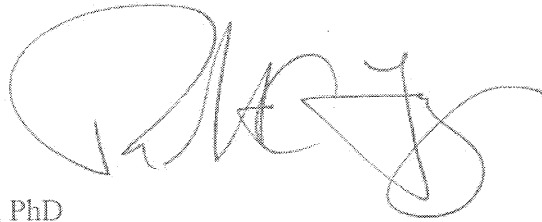
Also included are corresponding values for non-residential buildings – spaces that are not used for residences or where children are not continuously present. Non-residential buildings include commercial businesses and public buildings, churches, non-manufacturing businesses, and industries where these chemicals are not used as part of the manufacturing process. The non-residential screening levels were derived by adjusting the residential values by a factor of 4.2 to adjust from a 168-hour week for the residential exposure to a 40-hour work week for the non-residential exposure.

For industrial settings where the chemicals in question are used, OSHA permissible exposure limits or other occupational exposure values would apply.

If you have any questions regarding these values, please contact John Kollman in my program at (614) 752-8335.

Thank you.

Sincerely,

A handwritten signature in black ink, appearing to read 'RFrey', with a large loop at the end.

Robert Frey, PhD

Chief, Health Assessment Section, Ohio Department of Health

RF/jk

Table 1. Screening Levels – South Dayton Dump

Chemical of Concern	Residential		Source/Criteria	Non-residential		Source/Criteria
	$\mu\text{g}/\text{m}^3$	ppb		$\mu\text{g}/\text{m}^3$	ppb	
Indoor Air Screening Levels						
1,1-Dichloroethane	15	3.7	EPA RSL/C/ 10^{-5}	63	16	EPA RSL/C/ 10^{-5} x 4.2
Benzene	1	0.4	CREG/C/ 10^{-5}	4	2	CREG/C/ 10^{-5} x 4.2
Chloroform	100	20	ATSDR/NC	400	80	ATSDR/NC
cis-1,2-Dichloroethylene	35	8.8	OSWER/NC	150	37	OSWER/NC x 4.2
Ethylbenzene	300	60	ATSDR/NC	1,300	250	ATSDR/NC x 4.2
Tetrachloroethylene (PCE)	40	6	EPA RfC	170	25	EPA RfC x 4.2
Trichloroethylene (TCE)	2	0.4	EPA RfC	10	2	EPA RfC x 4.2
m,p-Xylene*	200	50	ATSDR/NC	800	200	ATSDR/NC x 4.2
o-Xylene*	200	50	ATSDR/NC	63	16	ATSDR/NC x 4.2
Vinyl chloride	1	0.4	CREG/C/ 10^{-5}	4	2	CREG/C/ 10^{-5} x 4.2
Sub-slab Soil Gas Screening Levels						
1,1-Dichloroethane	150	37	EPA RSL/C/ 10^{-5} x 10	630	160	EPA RSL/C/ 10^{-5} x 10 x 4.2
Benzene	10	4	CREG/C/ 10^{-5} x 10	40	20	CREG/C/ 10^{-5} x 10 x 4.2
Chloroform	1,000	200	ATSDR/NC x10	4,000	800	ATSDR/NC x10 x 4.2
cis-1,2-Dichloroethylene	350	88	OSWER/NC x 10	1,500	370	OSWER/NC x 10 x 4.2
Ethylbenzene	3,000	600	ATSDR/NC x10	13,000	2,500	ATSDR/NC x10 x 4.2
Tetrachloroethylene (PCE)	400	60	EPA RfC x 10	1,700	250	EPA RfC x 10 x 4.2
Trichloroethylene (TCE)	20	4	EPA RfC x 10	100	20	EPA RfC x 10 x 4.2
m,p-Xylene*	2,000	500	ATSDR/NC x 10	8,000	2,000	ATSDR/NC x 10 x 4.2
o-Xylene*	2,000	500	ATSDR/NC x 10	8,000	2,000	ATSDR/NC x 10 x 4.2
Vinyl chloride	10	4	CREG/C/ 10^{-5} x 10	40	20	CREG/C/ 10^{-5} x 10 x 4.2

*ATSDR comparison value for total xylenes

$\mu\text{g}/\text{m}^3$ = micrograms per cubic meter

ppb = parts per billion

C = cancer

NC = noncancer

10^{-5} = cancer risk of 1 in 100,000

CREG = cancer risk evaluation guide (ATSDR)

RfC = EPA Reference Concentration

RSL = Regional Screening Level (EPA April 2012)

Table 2. Action Levels – South Dayton Dump

Chemical of Concern	Residential		Source/Criteria	Non-residential		Source/Criteria
	$\mu\text{g}/\text{m}^3$	ppb		$\mu\text{g}/\text{m}^3$	ppb	
Indoor Air Action Levels						
1,1-Dichloroethane	150	37	EPA RSL/C/ 10^{-4}	630	160	EPA RSL/C/ 10^{-4} x 4.2
Benzene	10	4	CREG/C/ 10^{-4}	40	20	CREG/C/ 10^{-4} x 4.2
Chloroform	1,000	200	ATSDR/NC x 10	4,000	800	ATSDR/NC x 10 x 4.2
cis-1,2-Dichloroethylene	350	88	OSWER/NC x 10	1,500	370	OSWER/NC x 10 x 4.2
Ethylbenzene	3,000	600	ATSDR/NC x 10	13,000	2,500	ATSDR/NC x 10 x 4.2
Tetrachloroethylene (PCE)	400	60	EPA RfC/NC x 10	1,700	250	EPA RfC/NC x 10 x 4.2
Trichloroethylene (TCE)	20	4	EPA RfC/NC x 10	100	20	EPA RfC/NC x 10 x 4.2
m,p-Xylene*	2,000	500	ATSDR/NC x 10	8,000	2,000	ATSDR/NC x 10 x 4.2
o-Xylene*	2,000	500	ATSDR/NC x 10	630	160	ATSDR/NC x 10 x 4.2
Vinyl chloride	10	4	CREG/C/ 10^{-4}	40	20	CREG/C/ 10^{-4} x 4.2
Sub-slab Soil Gas Action Levels						
1,1-Dichloroethane	1,500	370	EPA RSL/C/ 10^{-4} x 10	6,300	1,600	EPA RSL/C/ 10^{-4} x 10 x 4.2
Benzene	100	40	CREG/C/ 10^{-4} x 10	400	200	CREG/C/ 10^{-4} x 10 x 4.2
Chloroform	10,000	2,000	ATSDR/NC x 100	40,000	8,000	ATSDR/NC x 100 x 4.2
cis-1,2-Dichloroethylene	3,500	880	OSWER/NC x 100	15,000	3,700	OSWER/NC x 100 x 4.2
Ethylbenzene	30,000	6,000	ATSDR/NC x100	130,000	25,000	ATSDR/NC x100 x 4.2
Tetrachloroethylene (PCE)	4,000	600	EPA RfC/NC x 100	17,000	2,500	EPA RfC/NC x 100 x 4.2
Trichloroethylene (TCE)	200	40	EPA RfC/NC x 100	1,000	200	EPA RfC/NC x 100 x 4.2
m,p-Xylene*	20,000	5,000	ATSDR/NC x 100	80,000	20,000	ATSDR/NC x 100 x 4.2
o-Xylene*	20,000	5,000	ATSDR/NC x 100	80,000	20,000	ATSDR/NC x 100 x 4.2
Vinyl chloride	100	40	CREG/C/ 10^{-4} x 10	400	200	CREG/C/ 10^{-4} x 10 x 4.2

*ATSDR comparison value for total xylenes

$\mu\text{g}/\text{m}^3$ = micrograms per cubic meter

ppb = parts per billion

C = cancer

NC = noncancer

10^{-4} = cancer risk of 1 in 10,000

CREG = cancer risk evaluation guide (ATSDR)

RfC = EPA Reference Concentration

RSL = Regional Screening Level (EPA April 2012)

APPENDIX L

AIR SAMPLING FIELD DATA SHEET

AIR SAMPLING FIELD DATA SHEET

Valley Asphalt Corporation

Moraine, Ohio

Address: _____

Owner's Name: _____

Telephone No: _____

Occupant's Name (if tenant): _____

Telephone No: _____

Is resident living in basement? YES ☐ NO ☐

Sub-Slab Sample:

Start Date/Time	Barometric Pressure	Outside Temp	Vacuum at Start	Sample ID#	ppbRAE VOC Conc.	SUMMA Canister ID	Regulator ID

End Date/Time	Vacuum at End	Location of Sub-Slab Sample

Indoor Air Sample:

Start Date/Time	Barometric Pressure	Outside Temp	Vacuum at Start	Sample ID#	ppbRAE VOC Conc.	SUMMA Canister ID	Regulator ID

End Date/Time	Vacuum at End	Location of Indoor Air Sample

PICTURES TO BE TAKEN:

Inside basement (all 4 directions) YES ☐ NO ☐

Sub-slab sample YES ☐ NO ☐

Indoor air sample YES ☐ NO ☐

Outside of residence (all 4 directions) YES ☐ NO ☐

IF HOUSE HAS A VAPOR ABATEMENT SYSTEM:

U-Tube Manometer (inches water column) _____ (ideal is greater than 1)

Vacuum Reading (inches water column) _____ at location _____

Vacuum Reading (inches water column) _____ at location _____

Vacuum Reading (inches water column) _____ at location _____

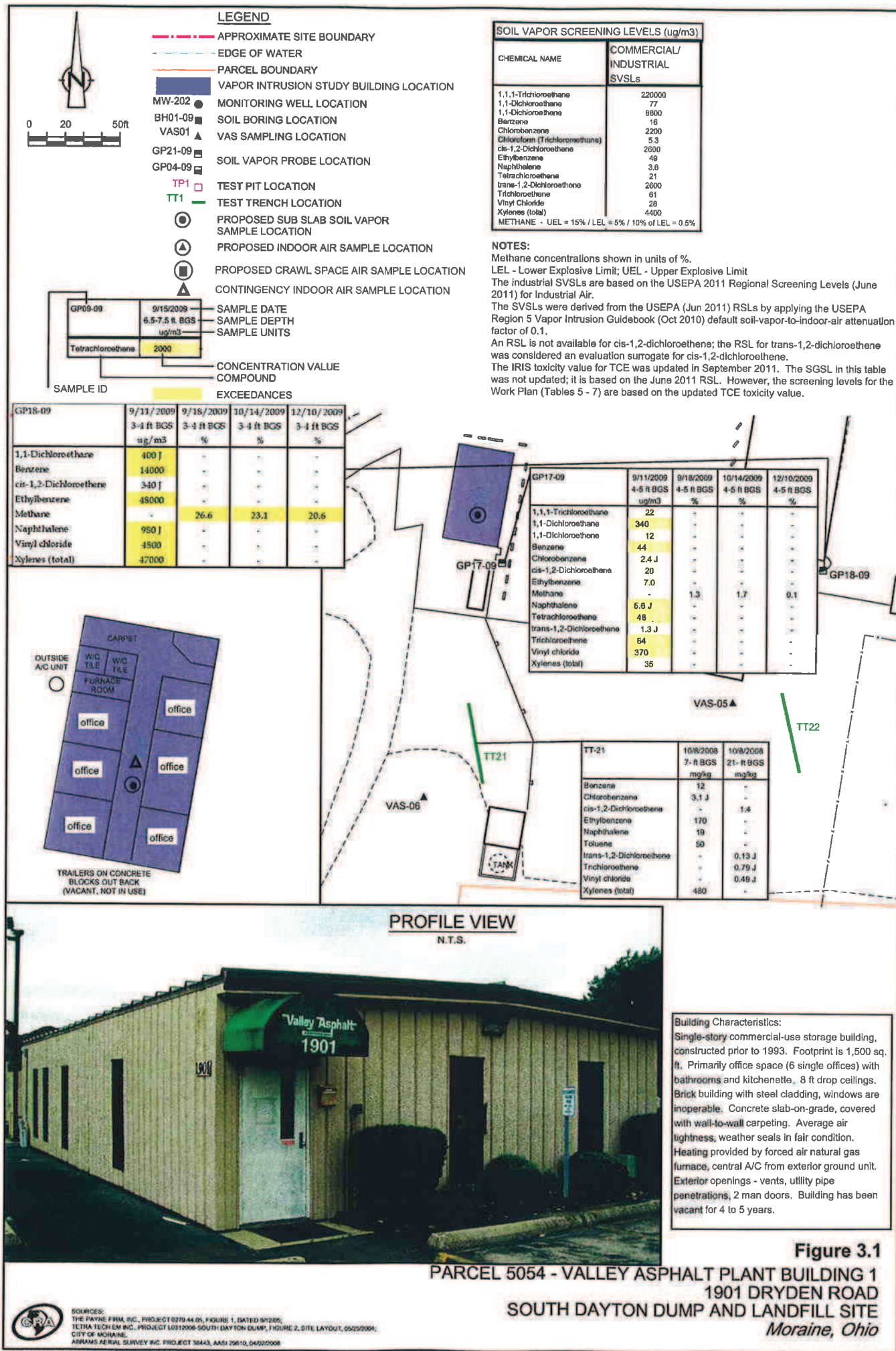
(ideal digital manometer vacuum reading is at least 0.01)

TYPE OF AIR SAMPLING ☐ Initial ☐ ___-day post mitigation ☐ ___-day post mitigation ☐ Quarterly Sample

Other _____

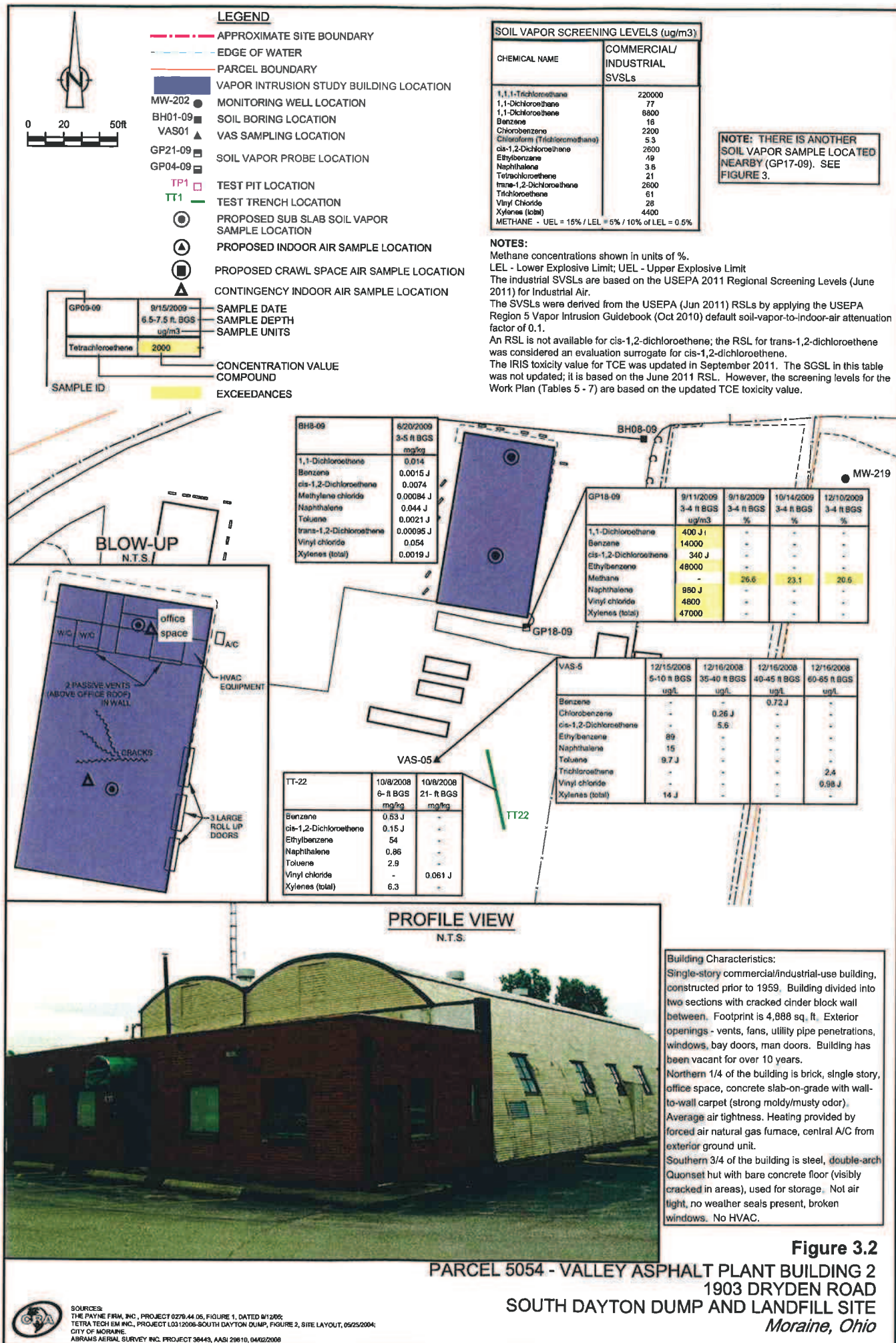
Comments:

FIGURES



SOURCES:
THE PAYNE FIRM, INC., PROJECT 0270 44 05, FIGURE 1, DATED 9/2/05;
TETRA TECH INC., PROJECT 0312006 SOUTH DAYTON DUMP, FIGURE 2, SITE LAYOUT, 05/25/2006;
CITY OF MORRIS;
AERIALS AERIAL SURVEY INC. PROJECT 38443, AASI 29610, 04/02/2008

38443-61(015)GN-WA014 AUG 08/2011



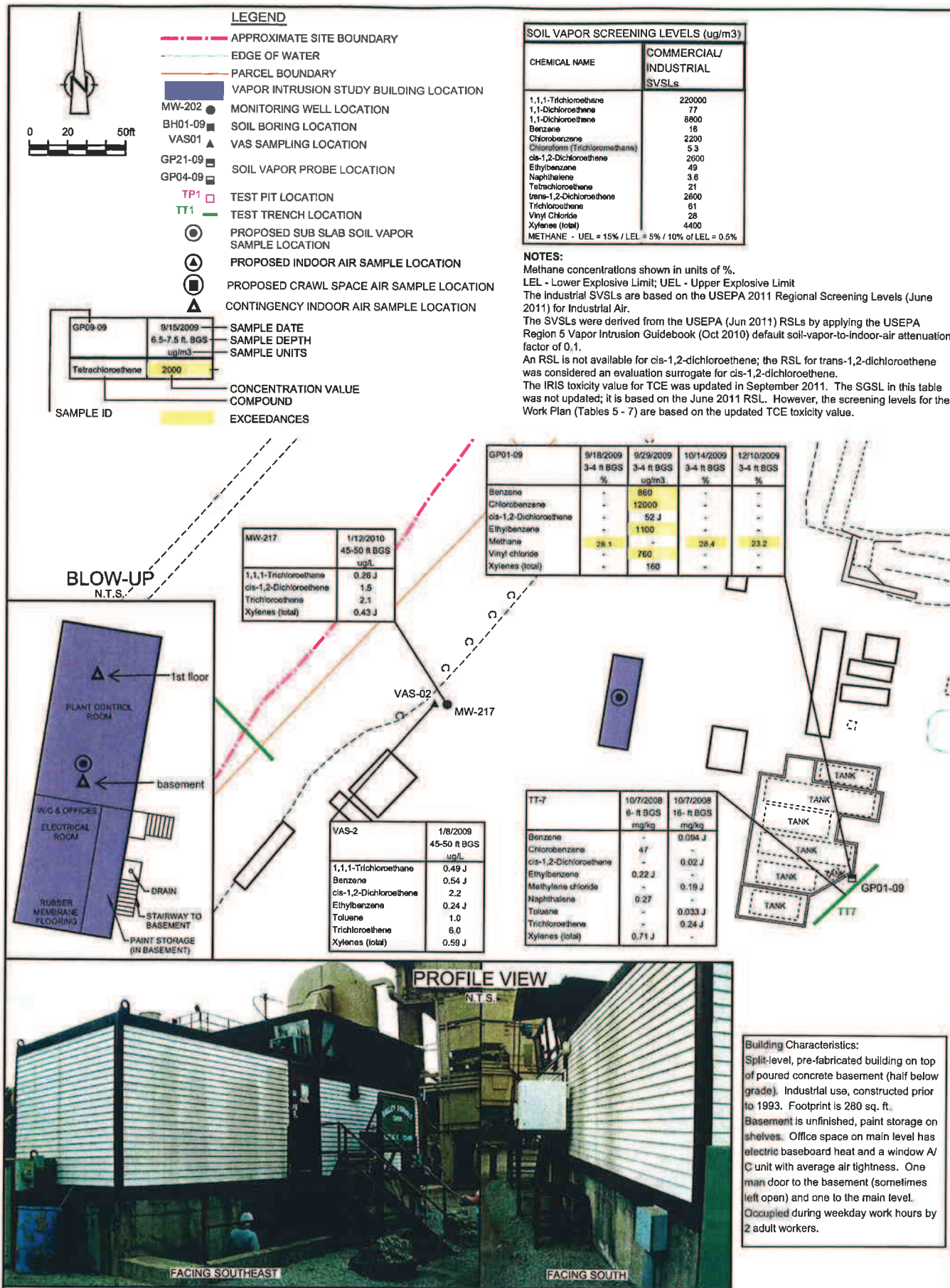


Figure 3.3
PARCEL 5054 - VALLEY ASPHALT PLANT BUILDING 4
1901 DRYDEN ROAD
SOUTH DAYTON DUMP AND LANDFILL SITE
Moraine, Ohio



SOURCES:
THE PAYNE FIRM, INC., PROJECT 027844.05, FIGURE 1, DATED 9/12/05;
TETRA TECH EM INC., PROJECT L0312006-SOUTH DAYTON DUMP, FIGURE 2, SITE LAYOUT, 06/25/2004;
CITY OF MORAINE;
ABRAMS AERIAL SURVEY INC., PROJECT 38443, AASH 20010, 04/02/2006

38443-61(015)GN-WA017 AUG 08/2011

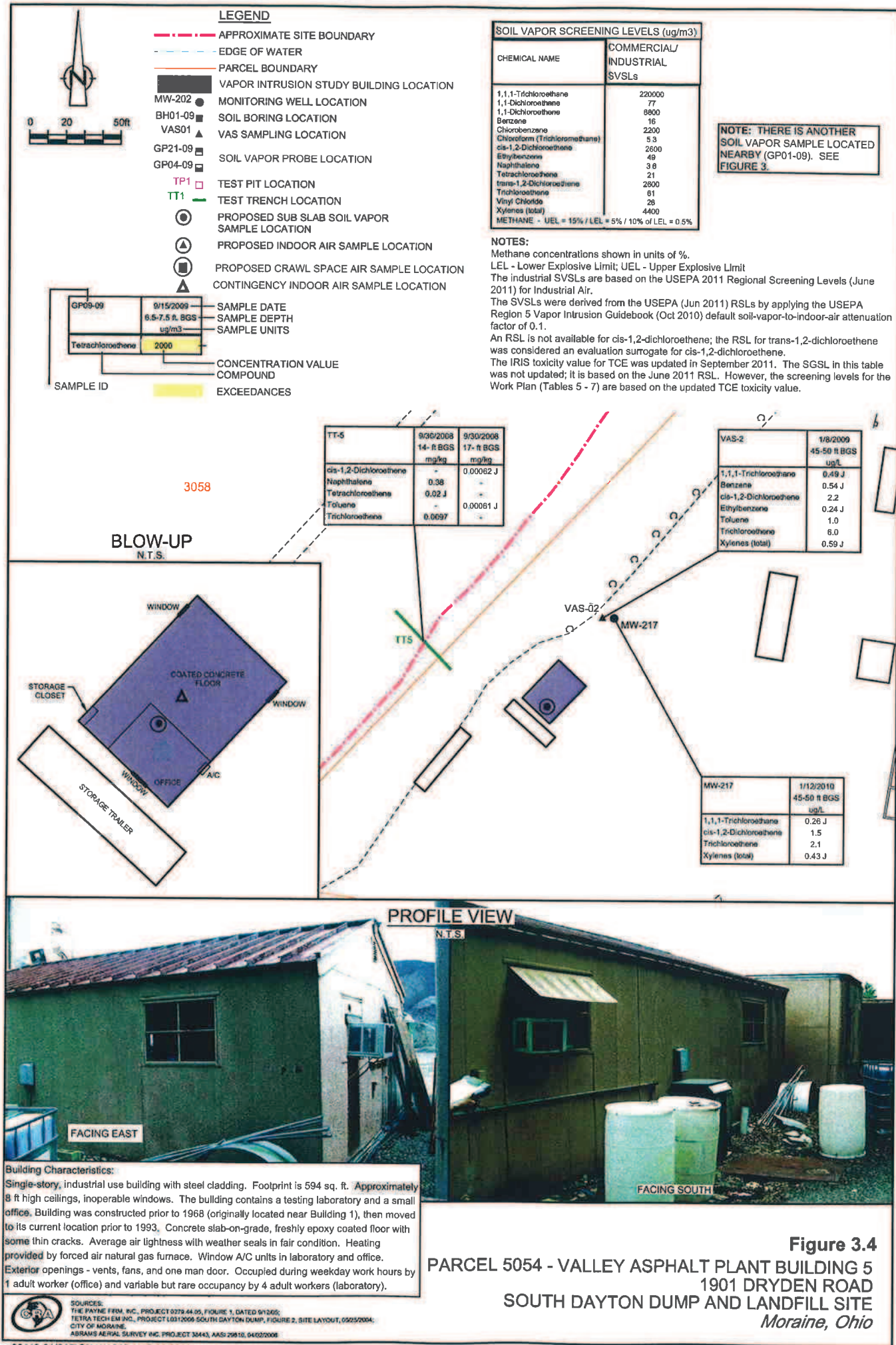


Figure 3.4
PARCEL 5054 - VALLEY ASPHALT PLANT BUILDING 5
1901 DRYDEN ROAD
SOUTH DAYTON DUMP AND LANDFILL SITE
Moraine, Ohio

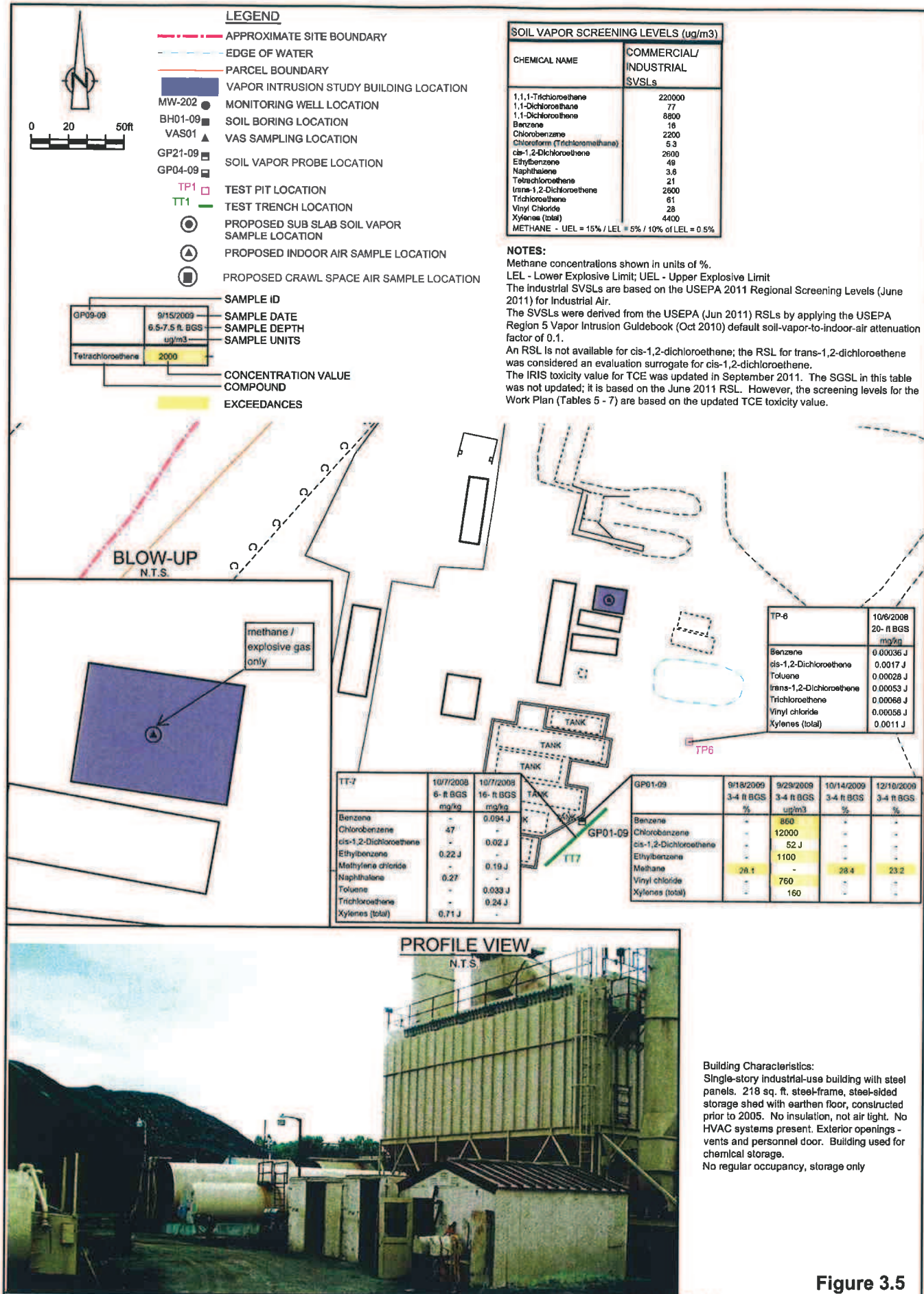


Figure 3.5

PARCEL 5054 - VALLEY ASPHALT PLANT BUILDING 6

1901 DRYDEN ROAD

SOUTH DAYTON DUMP AND LANDFILL SITE

Moraine, Ohio



SOURCES:
THE PAYNE FIRM, INC., PROJECT 0279-04.05, FIGURE 1, DATED 9/12/05;
TETRA TECH EM INC., PROJECT L0312006-SOUTH DAYTON DUMP, FIGURE 2, SITE LAYOUT, 05/25/2004;
CITY OF MORAINES
ABRAMS AERIAL SURVEY INC. PROJECT 38443, AASI 20810, 04/02/2008

38443-61(015)GN-WA019 AUG 08/2011

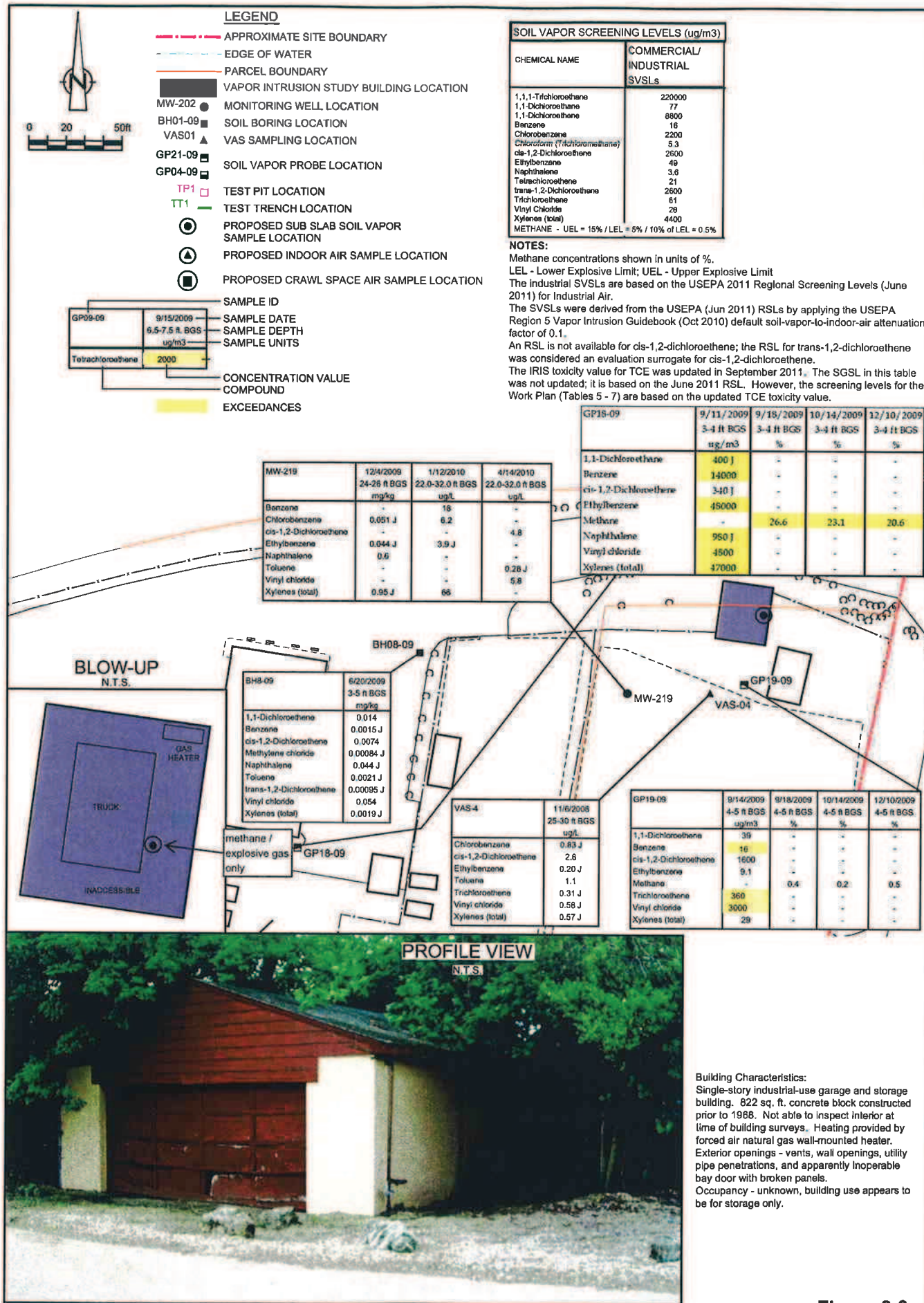
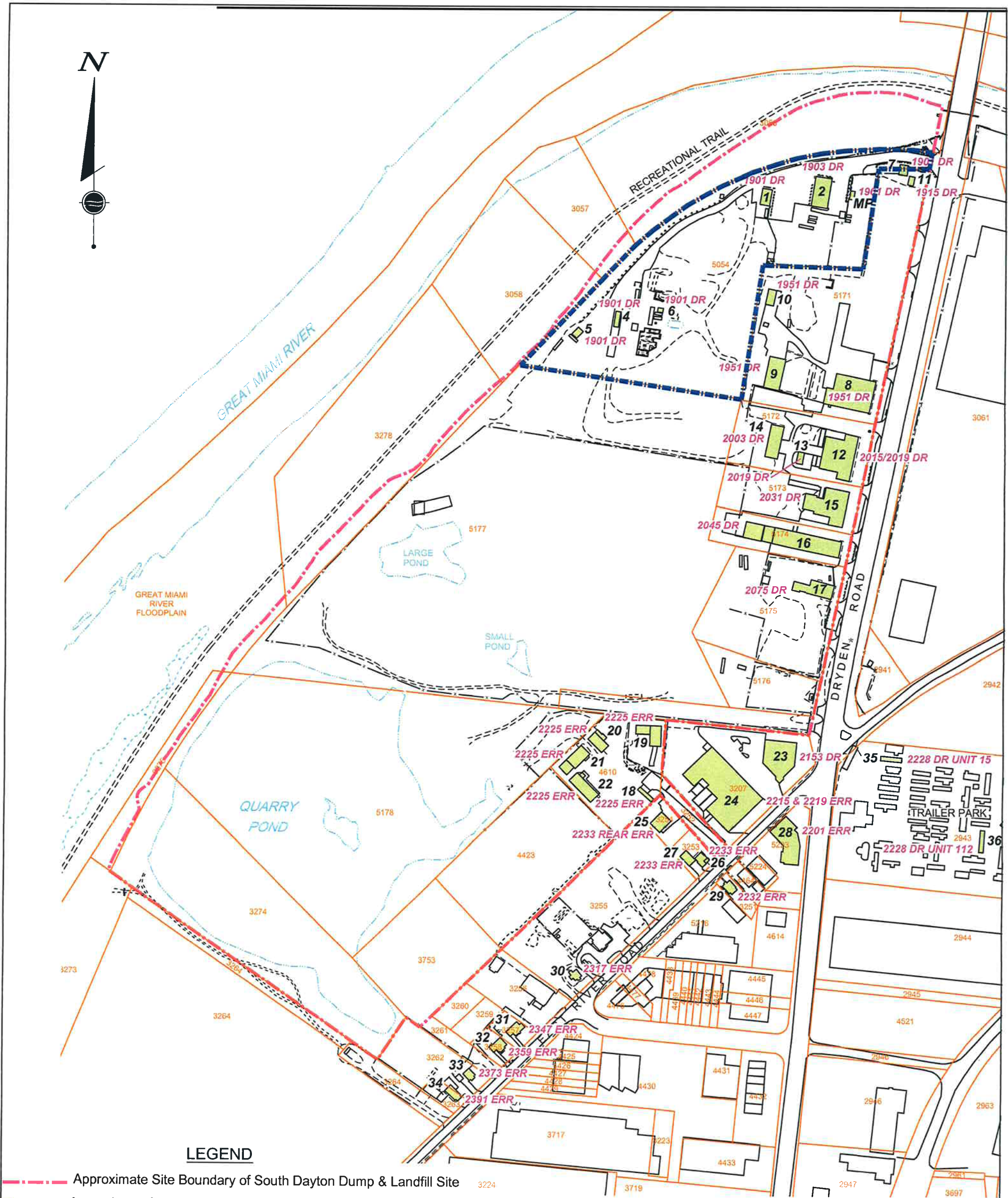


Figure 3.6
PARCEL 5054 - BUILDING 7
SOUTH DAYTON DUMP AND LANDFILL SITE
Moraine, Ohio



LEGEND

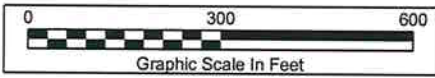
- Approximate Site Boundary of South Dayton Dump & Landfill Site
- Approximate Site Boundary of Valley Asphalt Site
- Edge of Water
- Parcel Boundary
- ERR East River Road
- DR Dryden Road
- Parcel Number
- USEPA Removal Program Building Number
- Address

Note: 1901 Dryden Road Parcel 5054 Building Was Demolished in February 2012

Site plan provided by:

Approximate Boundary of Valley Asphalt Site

1901-1903 Dryden Road,
Moraine, OH

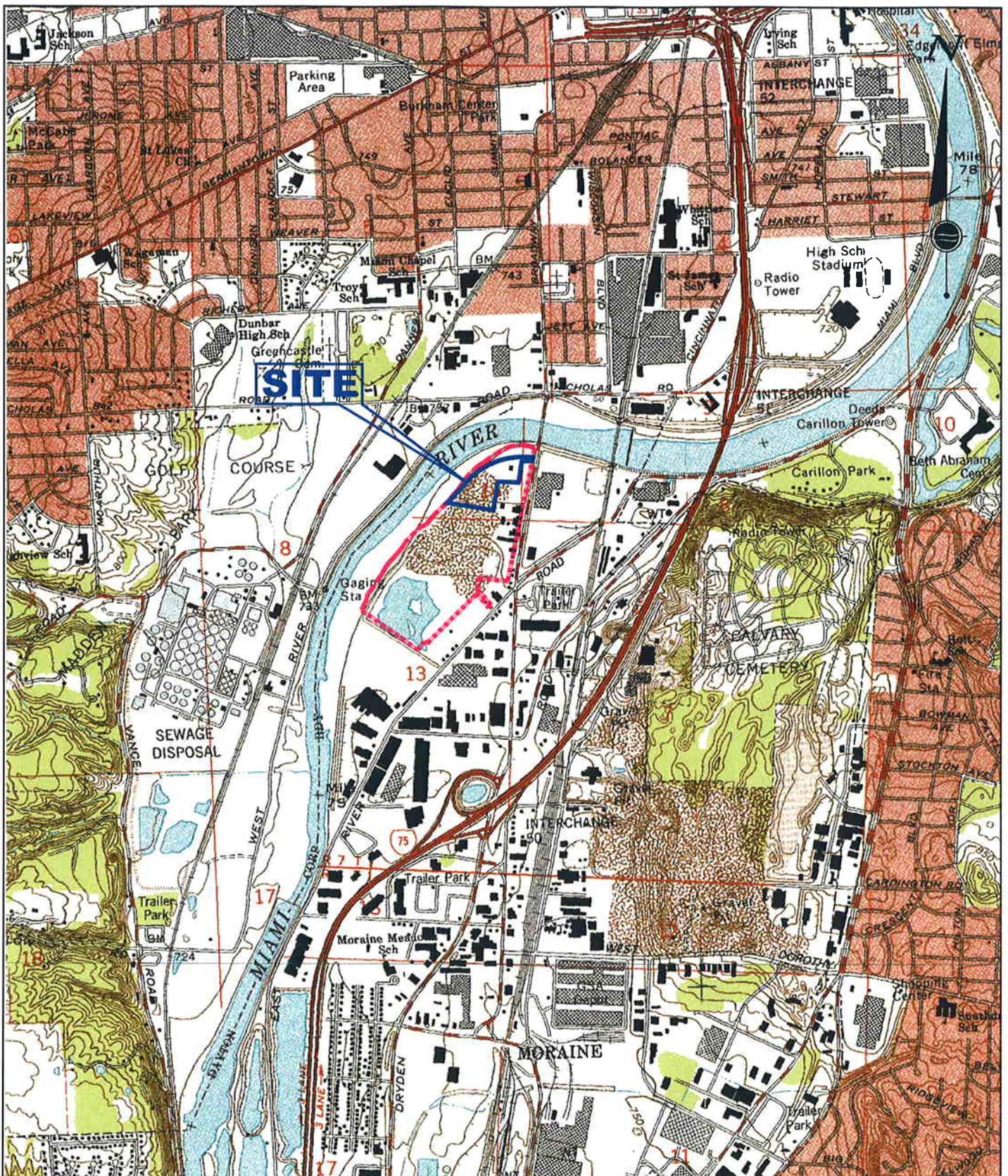


PROJECT NO.
161803
SCALE
GRAPHIC
FIGURE NO.
1.2

04-13/SR



**BOWSER
MORNER.**
4518 Taylorsville Road
Dayton, Ohio 45424
Ph 937-236-8805
Fax 937-233-2016



- Approximate Site Boundary of South Dayton Dump & Landfill Site
- - - Approximate Site Boundary of Valley Asphalt Site

USGS QUAD: Dayton South, Ohio

Site Location Map

1901-1903 Dryden Road,
Moraine, OH

PROJECT NO.
161803

SCALE
1:2000

FIGURE NO.
1.1



**BOWSER
MORNER**

4518 Taylorsville Road
Dayton, Ohio 45424
Ph 937-236-8805
Fax 937-233-2016

04-13/SR